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16 JULY 1990



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# ***JPRS Report***

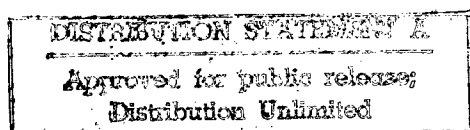
# **Science & Technology**

***USSR: Life Sciences***

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# Science & Technology

## USSR: Life Sciences

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UDC 613.693:612.171.1

### **Diagnostic Possibilities of Inflight EKG Monitoring of Flight Crew**

907C0049C Moscow VOYENNO-MEDITSINSKIY  
in Russian No 5, May 89 pp 57-59

[Article by Reserve Medical Corps Col. V. M. Kondrakov, professor, and Medical Corps Capt. V. I. Sinopalnikov]

[Abstract] Ambulatory inflight EKG monitoring was carried out on 22 pilots, ranging in age from 35 to 45 years, to evaluate this method for pilot health screening. The results disclosed that the use of the Soviet Lenta-MT monitor facilitated diagnosis of latent forms of coronary heart disease, arrhythmia, and conductive disorders in 15 of the subjects. All had previously passed fitness certification after conventional stress testing, which points to the utility of the ambulatory inflight monitoring in uncovering potential health problems in pilots. Figures 2; references 10: 6 Russian, 4 Western.

UDC 613.693:612.17

### **Effects of Rolling Motion on the Circadian Rhythm of Sinoatrial Node**

907c0049D Moscow VOYENNO-MEDITSINSKIY  
in Russian No 5, May 89 pp 59-61

[Article by Medical Corps Col. A. M. Marchenko, candidate of medical sciences, and Medical Corps Col. A. O. Nesterko, doctor of medical sciences]

[Abstract] EKG studies were performed on 33 healthy sailors with a mean age of 37.5 years to assess the effects of seasickness on circadian rhythmicity of the sinoatrial node. The results demonstrated considerable individual variability in susceptibility to desynchronization of the self-excitation pattern and attendant deterioration of capacity for work. In individuals regarded as well adapted, usually with a work history of 10-15 years at sea, the changes were less pronounced and recovery was more rapid. This approach was felt to provide an objective assessment of the severity of seasickness, an important factor in determining occupational fitness and health status. References 14: 11 Russian, 3 Western.

UDC 613.693:616-001.12-084

### **Probability of Decompression Sickness During Space Suit Testing**

907c0058A Moscow KOSMICHESKAYA BIOLOGIYA I AVIAKOSMICHESKAYA MEDITSINA in Russian Vol 23 No 3, May-Jun 89 (manuscript received 20 Jun 88) pp 53-58

[Article by S. N. Filipenkov]

[Abstract] An assessment is presented of the results derived from an extensive series of trials conducted on

space suits and decompression procedures to assess their efficacy in prevention of decompression sickness (DS). The studies involved 193 volunteers (mean age 28 years, 72 kg, 9.6 kg body fat, 1056 ml dissolved N<sub>2</sub>) with good tolerance of moderate hypoxia (5 km, 30 min) and low barometric pressure (12 km, 20 min, following 1 h O<sub>2</sub> inhalation). The data demonstrated that with prolonged physical exertions on the order of 100-300 kcal/h and in-suit pressures of 105-320 mm Hg, commonly employed decompression procedures are effective in preventing DS with a probability of 0.75-0.9 after 1-2 h of oxygen inhalation under terrestrial-equivalent conditions. A probability of 0.9-0.98 for the prevention of DS was theoretically attainable with a short period of decompression for several minutes with a coefficient of supersaturation of 3.3-5.4. However, with a coefficient of supersaturation of 1.9-2.1, success in prevention of DS with a probability of 0.98-0.99 was shown to require oxygen breathing for 0.5-1 h. A similar level of probability (0.95-0.97) with 1-6 h desaturation at low pressure (40-41 kPa) was attainable only with moderate exertion or less than a 15 min exertion at 26-29 kPa. References 11: 8 Russian, 3 Western.

UDC 629.78:616-001.11/.12-07:616.154.19

### **Changes in Maximum Allowable Supersaturation Coefficient in High-Altitude Decompression**

907c0058B Moscow KOSMICHESKAYA BIOLOGIYA I AVIAKOSMICHESKAYA MEDITSINA in Russian Vol 23 No 3, May-Jun 89 (manuscript received 13 Jul 87) pp 58-62

[Article by V. I. Chadov and L. R. Iseyev]

[Abstract] Male volunteers were used in pressure chamber studies designed to assess changes in the maximum allowable coefficient of supersaturation (MACS) in relation to pressure after decompression, in order to assess the safety of high-altitude decompression procedures. The 70 volunteers ranged in age from 21 to 47 years and underwent a total of 383 measurements between 1981 and 1985 that simulated transition from an orbital station to a space suit at reduced oxygen tension. MACS values were seen to decrease from 1.661 at 452 kPa (6300 m, 339 mm Hg), to 1.608 at 467 kPa (6080 m, 350 mm Hg), to 1.55 at 268 kPa (201 mm Hg), and 1.24 at 240 kPa (180 mm Hg). In practical terms the plots of coefficient of supersaturation vs. pressure after decompression demonstrated that MACS does not change significantly over an altitude range of 6100-9300 m, retaining a value of essentially 1.6. Accordingly, this figure provides an acceptable margin of safety for the prevention of decompression sickness. Figures 2; references 7 (Russian).



UDC 613.632.4:547.292]:[613.155-07:616.152.11

### Effects of Prolonged Exposure to Acetic Acid Vapors on Acid-Base Balance in Humans

907c0058C Moscow KOSMICHESKAYA BIOLOGIYA I AVIAKOSMICHESKAYA MEDITSINA in Russian Vol 23 No 3, May-Jun 89 (manuscript received 11 Mar 88) pp 65-68

[Article by L. Kh. Bragin]

[Abstract] Acid-base monitoring and determinations of blood gases were conducted on 8 healthy males, 25-44 years old, to assess the physiological effects of prolonged exposure to 15 or 25 mg/m<sup>3</sup> acetic acid vapors. Acetic acid was selected for the study for the reason that it is one of the key body surface metabolites and has previously been shown to be innocuous in concentrations of 10 mg/m<sup>3</sup>. The experimental conditions utilized exposure for 20 days, with the temperature elevated to 33°C from day 16 through day 19 in one set of experiments and from day 6 through day 9 in another. The blood chemistries demonstrated that the lower exposure level was innocuous in the long run, with any changes that were observed of limited duration. Data on the higher dosage showed more pronounced alteration in acid-base equilibrium, but again within physiological limits and without long-term sequelae. Nevertheless, a concentration of 25 mg/m<sup>3</sup> was felt to represent the upper limit of physiologically tolerable acetic acid concentration in the environment. References 19: 16 Russian, 3 Western.

UDC 629.78:[617.7-018-02:612.482.5]-076.5

### Effects of Taurine on Cytogenetic Corneal Disturbances Induced in Mice by 9 GeV Protons

907c0058D Moscow KOSMICHESKAYA BIOLOGIYA I AVIAKOSMICHESKAYA MEDITSINA in Russian Vol 23 No 3, May-Jun 89 (manuscript received 19 Feb 88) pp 86-89

[Article by S. V. Vorozhtsova and Ye. I. Yartsev]

[Abstract] The fact that protons account for some 80% of cosmic radiation led to a more detailed analysis on the efficacy of taurine drops in mitigating proton-induced cytogenetic damage to the cornea. The experiments were performed with (CBA x C<sub>57</sub>BL<sub>6</sub>)F<sub>1</sub> mice (16-18 g) irradiated with 9 GeV protons in doses ranging from 0.25 Gy to 7.0 Gy. Certain animals were treated with 2 drops of 4% taurine solution in each eye five times before or after irradiation. Corneal monitoring at 24 and 72 h demonstrated that proton irradiation led to a reduction in mitotic activity, an increase in the number of cells with chromosomal abnormalities, and cell depletion. These changes were essentially dose-dependent. Treatment with taurine reduced the number of cells with chromosomal abnormalities by two- to fivefold and was effective when administered both before and after irradiation. The effects of taurine were attributed to the fact that it had an inhibitory effect on mitosis, limiting thereby the extent of primary

radiation damage and, consequently, postradiation damage to the genome. Figures 3; references 9: 6 Russian, 3 Western.

UDC 574.682:616-008.927.4-008.61]-07

### Combined Effects of Elevated Concentrations of Carbon Dioxide and Ambient Temperature on Thermal State of Humans in Closed Chambers

907c0058E Moscow KOSMICHESKAYA BIOLOGIYA I AVIAKOSMICHESKAYA MEDITSINA in Russian Vol 23 No 3, May-Jun 89 (manuscript received 22 Jul 88) pp 89-90

[Article by A. V. Sosnovskiy]

[Abstract] An analysis was conducted on the thermal state of 10 males exposed to elevated carbon dioxide concentration and temperatures in 50 m<sup>3</sup> closed chambers for 5 days. The experimental parameters were as follows: 26-28°C, 70-85% rel. humidity, 740-770 mm Hg barometric pressure, 3-3.5% CO<sub>2</sub>, 20-21% O<sub>2</sub>, and N<sub>2</sub> to make 100% gas mixture. Physiological monitoring showed that mean body temperature remained unaffected as a result of elevation of the skin temperature by 0.7°C and a reduction in rectal temperature by 0.5°C. However, both the respiratory and heart rates were significantly increased (P < 0.05). On balance, the data indicated that the level of discomfort and changes in body temperature regulation under the combined effects of elevated concentrations of carbon dioxide and ambient temperature serve to diminish work performance. References 6: 4 Russian, 2 Western.

UDC 656.7.071.13:331.363]:612.766.1

### Psychophysiological Assessment of Piloting Motor Habits in Pilot Retraining

18400486e Moscow VOYENNO-MEDITSINSKIY ZHURNAL in Russian No 1, Jan 89 pp 54-57

[Article by N.N. Frolov, doctor of medical sciences, and A.S. Kuzmin, cand. technical sci., Lt. Colonel]

[Abstract] An analysis was conducted on the motor activity of pilots undergoing retraining on single-seat airplanes during landing maneuvers. The study was performed with 56 pilots during 290 flights. In general, as the pilots gained familiarity and experience with the new planes there was a gradual reduction in the number of control column movements and their amplitudes. Correspondingly, the quality of landings improved. The reduction in the incidence of control and adjustment movements was accompanied by an increase in the number of fine feedback movements. Readjustment of pilots to new airplanes appears to involve fine-tuning of established habituated movements rather than a fundamental restructuring of underlying motor activity inherent in piloting skills. Consequently, fine feedback movements that appear as second nature and represent a form of internal automation may be used to assess the degree of piloting habituation. Tables 1; references 8 (Russian).

UDC 577.115.3+632.93

**Specific Immunosuppression of Potatoes by  
Phytophthora Glucans**

907c0023B Moscow DOKLADY AKADEMII NAUK  
SSSR in Russian Vol 307 No 3, Jul 89 (manuscript  
received 16 Dec 88) pp 743-747

[Article by N. I. Vasyukova, G. V. Leontyeva, G. I. Chalenko and O. L. Ozeretskovskaya, Institute of Biochemistry imeni A. N. Bakh, USSR Academy of Sciences, Moscow]

[Abstract] In order to better assess immune factors responsible for resistance and susceptibility of potatoes to *Phytophthora infestans*, a study was conducted on the production of phytoalexins (rishitin) and sterols by susceptible and resistant potatoes in response to infection. Infection of resistant plants was shown to lead to production of high levels of rishitin and depress sterol levels, with the inverse relationship seen in susceptible tubers. Confirmatory results were obtained with glucans isolated from *P. infestans*. Glucans from incompatible *P. infestans* races promoted synthesis of high levels of rishitin while inhibiting synthesis of sterols, whereas glucans from compatible races had the opposite effect.  $\beta$ -Sitosterol, the sterol shown to be most effective in stimulating growth of *phytophthora*, was the component synthesized in the highest concentrations in response to induction by glucans from compatible *phytophthora* races, reaching 23.7  $\mu$ g/g of tuber tissue. References 8: 6 Russian, 2 Western.

UDC 632.4+581.19+632.938.1.2

**Pseudofungicides: Search Methods, Mechanisms  
of Action, Use for Plant Protection**

18400635 Moscow PRIKLADNAYA BIOKHIMIYA I  
MIKROBIOLOGIYA in Russian Vol 25 No 3,  
May-Jun 89 (Manuscript received 18 May 87)  
pp 405-416

[Article by S. L. Tyuterev, N. N. Stepanichenko, L. N. Ten, N. Sh. Navrezova, All-Union Scientific Research Institute of Plant Protection, Leningrad]

[Abstract] The purpose of this work was to screen substances that alter the metabolism of the fungus *V. dahliae* and lead to accumulation of disease resistance inducers in plants. Equally important was the development of a method of searching for such substances and studying their mechanisms of action. Forty-five substances were screened. They consisted of biologically active substances now in use in agriculture—fungicides whose mechanisms of action are little studied; compounds that are similar in structure to known inhibitors of melanin and lipid biosynthesis; and substances that are felt to produce a pseudofungicidal effect and are being produced now and whose use offers economic advantages. The results indicate the feasibility of directed search for disease resistance inducers or pseudofungicides among the chemical compounds that control and alter the metabolism of plants in directions unfavorable for pathogens and pests. Some of the substances tested were found to be inhibitors for metabolic pathways followed by *V. dahliae*. References 20: 13 Russian, 7 Western.

UDC 577.11

**Isolation and Characterization of Nerve Growth Factor (NGF) Isolated from Central Asian Viper *Echis Multisquamatus***

90070052 Moscow *BIOKHIMIYA in Russian* Vol 54 No 6, Jun 89 (manuscript received 15 Nov 88) pp 987-991

[Article by D. Kh. Khamidov, L. Ya. Yukelson, R. S. Salikhov and M. G. Khafizova, Institute of Biochemistry, Uzbek SSR Academy of Sciences, Tashkent]

[Abstract] Conventional ultracentrifugation and chromatographic techniques were employed for the isolation and characterization of NGF from the venom of *Echis multisquamatus*. NGF was obtained in a yield of 0.25%, consisting of a glycoprotein with 1-2% carbohydrate content. NGF exhibited marked growth-stimulating activity in spinal ganglion cultures of 7- to 9-day-old chick embryos. Gel chromatography on Sephadex G-75 indicated that the MW of the NGF preparation was 33,000-37,000 D, while electrophoresis in an SDS system provided a figure on the order of 13,000 D. Isoelectrofocusing of NGF showed that its pI was 7.1-7.2. Figures 6; references 18: 5 Russian, 13 Western.

UDC 577.1

**Monoclonal Antibodies in Histochemical Visualization of Glutamate Receptors in Human Brain**

907C0022B Moscow *DOKLADY AKADEMII NAUK SSSR in Russian* Vol 307 No 2, Jul 89 (manuscript received 15 Dec 88) pp 495-496

[Article by Ye. A. Orlova, G. F. Kalantarov, T. M. Smirnova and S. A. Dambinova, Scientific Research Institute of Experimental Medicine, USSR Academy of Medical Sciences, Leningrad]

[Abstract] Three sets of monoclonal antibodies were obtained against glutamate-binding membrane proteins isolated from human brain and were employed as immunochemical reagents for histochemical localization of glutamate receptors in the human brain. Immunoblotting on nitrocellulose filters demonstrated that the antibodies reacted with a single 60-65 kD protein component. Immunoperoxidase labeling revealed that one set of the monoclonal antibodies reacted with pyramidal cells; a second set with neuropil, neurons, and sediment cylinders of myelinated and unmyelinated fibers; and the third with a thick network of fine fibers in the superficial cortical layer. None of the monoclonal antibodies reacted with the rat brain. These observations provide further confirmation for the heterogeneity of glutamate receptors in the human brain and may be useful in defining subtypes of glutamate receptors. Figures 2; references 11: 5 Russian, 6 Western.

UDC 577.1

**Structure-Function Relationships of Interleukins 1 and 2**

907C0023C Moscow *DOKLADY AKADEMII NAUK SSSR in Russian* Vol 307 No 3, Jul 89 (manuscript received 14 Nov 88) pp 747-751

[Article by A. A. Kolobov, N. I. Kolodkin, N. M. Kalinina, A. S. Simbirtsev, S. A. Ketlinskiy and O. A. Kaurov, All-Union Scientific Research Institute of Highly Purified Biopreparations, Leningrad]

[Abstract] Structure-function studies were conducted on human interleukins (IL-1 $\alpha$ , IL-1 $\beta$ , IL-2) in order to identify active sites. The studies were based on ligand-receptor interactions using selected peptide sequences. Information on the generation of  $\theta$ -antigen on T-cells of mouse bone marrow cells and effects on levels of PG-E<sub>2</sub> of sticky splenocytes of CBA mice showed that the spatial structure of the active sites of IL-1 $\alpha$  and IL-1 $\beta$  were quite similar. The active sites consisted of amino acid sequences 171-178 and 233-252 in the case of IL-1 $\alpha$ , and 163-171 and 223-246 in the case of IL-1 $\beta$ . Data on IL-2 demonstrated that the active sites encompassed the sequences 27-35 and 45-56. Figures 2; references 14: 4 Russian, 10 Western.

UDC 577.124.5:57.083.13

**Supermolecular Structure of Acidic Exopolysaccharide of Obligate Methylophilic *Methylobacillus methylophilus* on Gel Formation in Alkaline Media**

907C0282A Moscow *PRIKLADNAYA BIOKHIMIYA I MIKROBIOLOGIYA in Russian* Vol 25 No 5, Sep 89 (manuscript received 3 Aug 87) pp 651-657

[Article by S. Yu. Shchegolev, L. A. Starukhina, and V. V. Deryabin, All-Union Scientific Research Institute of Protein Biosynthesis, Moscow]

[Abstract] In order to elucidate possible mechanisms for the reversible isothermal gel formation observed when the pH of a system containing an acidic exopolysaccharide (EPS) isolated from the obligate methylophilic bacterium *Methylobacillus methylophilus* is raised, the supermolecular structure of the EPS was studied as a function of ionic composition and pH. Optical density was measured at 400, 450, 500, 550, and 600 nm. At pH levels below gel formation a relatively stable permolecular particle fraction was seen. About 2-5 percent of the total mass was found in a dispersed colloidal phase. An increase in supermolecular particle diameter observed at pH 8-9 may be connected with a change in the degree of water immobilization. Assumptions about the pH dependence of swelling (pH < 8) or compression (pH /g 8) of the particles, connected with changes in electrical charge of the macromolecule, lead to a rather consistent, practically constant particle concentration, as determined by spectroturbidometry. When the gel formation

pH (i.e., 13.5 for addition of NaOH or 12.8 for addition of  $\text{CA}(\text{OH})_2$ ) is reached, precipitous increases in particle diameter and concentration were noted, which could be connected with system phase separation. In the presence of sodium acetate, the concentration of polymeric particles is practically unchanged when NaOH is added at the gel formation pH of 13.2. This indicates coagulation of particles, rather than formation of a new phase. Maintenance of electrical charge due to acetate adsorption may be one of the principal reasons a new phase did not form. The results obtained indicate that the EPS investigated may serve as an alternative to dextran in industrial applications. Figures 3; references 21: 13 Russian, 8 Western.

UDC 577.352.2:576.314:612.111+57.086

**Interaction of Erythrocyte Plasmatic Membranes With "Solid" Liposomes (Neutral and Negatively Charged)**

907C0282A Moscow BIOLOGICHESKIYE  
MEMBRANY in Russian Vol 6 No 9, Sep 89  
(manuscript received 10 Oct 88) pp 955-965

[Article by N. V. Belitser and M. G. Anishchuk, Institute of Biochemistry imeni A. V. Palladin, UkSSR Academy of Sciences, Kiev, A. A. Bogdanov, and V. P. Torchilin, Institute of Experimental Cardiology, All-Union Cardiological Research Center, USSR Academy of Medical Sciences, Moscow]

[Abstract] The interaction of human erythrocytes with synthetic liposomes formed from dipalmitoylphosphatidyl choline (DPPC), or N-glutaryl-dipalmitoylphosphatidyl ethanolamine (GDPPE) (in a GDPPE:DPPC molar ratio of 1:9) was investigated. Incubation for 5 minutes at 30°C with DPPC was shown by electron microscopy to produce structural defects in the cellular membrane. Thirty minutes of incubation caused cell swelling. Some stage I echinocytes were seen. The structures of the adsorbed liposomes varied from spherical vesicles to multilamellar aggregates. After 60 minutes, the echinocyte levels reached 30-40 percent. When the negatively charged "solid" liposomes containing DPPC and GDPPE were used, erythrocyte morphology was markedly changed after 5 minutes of incubation, with all cells forming stage I-III echinocytes. After 30 minutes, some echinocyte spicules became thinner and began to release isolated cellular particles. Small spherical liposomal vesicles predominated, with some flat lamellae. Intercell membrane contact increased. After 60 minutes of incubation, liposomes adsorbed on the cell surface were not found. Small local membrane outgrowths and membrane evagination were observed. When the erythrocytes were subjected to preliminary treatment with the cross-linking agent glutaraldehyde, the erythrocytes did not later morphology on incubation with the liposomes, even though adsorption of liposomes was observed. No

membrane rupture was noted. After preliminary treatment with the bis-dimethyl amide of azocarbonic acid, all erythrocytes formed spherocochinocytes with surface liposome vesicles. Fragments of liposomal membrane were generally absent. Comparison of results obtained on erythrocytes with previous work on epithelial cells indicates that erythrocytes lack the receptor-like binding sites found in epithelial cells. One may conclude that the nature of cellular membrane interaction with "solid" liposomes depends on the features of the plasmatic membrane. Introduction of negative charge into the liposome sharply increased adsorption and elicited more rapid morphological disturbances. The gradual saturation of the cellular surface with exogenous lipids is involved in the mechanism of the changes observed. The data indicate that negatively charged "solid" liposomes behave in a similar fashion to "liquid" liposomes. Figures 4; references 26: 4 Russian, 22 Western

UDC 541(64+572)577.15

**Reinforced Chemiluminescence in Solutions of Polyelectrolyte Complexes**

907c0024B Moscow DOKLADY AKADEMII NAUK  
SSSR in Russian Vol 307 No 4, Aug 89 (manuscript  
received 17 Dec 88) pp 1004-1006

[Article by Ye. L. Gorovits, Ye. M. Gavrilova, V. A. Izumrudov, A. M. Yegorov and A. B. Zevin, Moscow State University imeni M. V. Lomonosov]

[Abstract] An analysis was conducted on the effects of sodium polymethacrylate (polyanion, 3000 MW, PMC), poly-N-ethyl-4-vinylpyridinium bromide (polycation, 18-9,000 MW, PEVP) and PMC-PEVP complex on chemiluminescence of horseradish peroxidase (HP)-catalyzed oxidation of luminol and para-iodophenol by hydrogen peroxide. Addition of PMC to the HP solution did not affect chemiluminescence, and the intensities of PMC-HP conjugates and the free HP were superimposable vis-a-vis HP concentration. Addition of PEVP diminished the intensity of the reaction catalyzed by free HP. However, addition of PEVP to a reaction catalyzed by the PMC-HP conjugate resulted in linear quenching of chemiluminescence with complete inhibition when the mixture attained the stoichiometric relationship  $[\text{PEVP}]/[\text{PMC-HP}] = 1$ . The fact that PEVP did not affect chemiluminescence when added to mixtures of PMC and HP demonstrated that the enzyme does not compete with linear polyions in interpolyelectrolyte reactions and is not incorporated into the PMC-PEVP complexes. Addition of NaCl led to dissociation of the various complexes and reversal of quenching. These observations demonstrated that the various polycationic and polyanionic polymers can be used to control enzymatic reactions of this type and may be used to design novel luminescent enzyme immunoassays. Figures 2; references 7: 4 Russian, 3 Western.

UDC 577.21

**Cloning of Human ApoA1 Gene and Its Expression in Murine Fibroblasts**

907C0283B Kiev BIOPOLIMERY I KLETKA in Russian Vol 5 No 5, Sep-Oct 89 (manuscript received 10 Mar 89) pp 105-107

[Article by V. N. Shulzhenko, L. L. Lukash, L. N. Shulyak, Ye. V. Usenko, and V. A. Kordyum, Institute of Molecular Biology and Genetics, UkSSR Academy of Sciences, Kiev; Kharkhov Scientific Research Institute of Therapy, UkSSR Ministry of Public Health]

[Abstract] Due to the involvement of its product in the development of atherosclerosis, the human gene ApoA1 was obtained by screening 300,000 recombinant phages using a 40-residue oligonucleotide complementary to a fragment of the gene. The PstI-fragment of phage DNA, which gave a positive blot hybridization test with the probe, was subcloned into the pUC18 plasmid. Restriction mapping demonstrated the identity of the fragment obtained with the ApoA1 gene. Three molecular constructs were used to study expression: pUC18-Apo and pUC18-Apo', containing the ApoA1 gene with its own promoter in different orientations, and paL1-Apo, containing the polylinker promoter RNA- polymerase III at the BamHI site. Transfection of line LTK<sup>-</sup> mouse fibroblasts was conducted. No ApoA1 product protein was observed in the cell lysate. Immunoenzyme measurement of ApoA1 in culture medium indicated that maximal secretion was seen on days 3-10 after plasmid introduction. Addition of exogenous lipids did not enhance protein secretion. More secretion was obtained

from the paL1-Apo construct, indicating that the ApoA1 promoter is weak. Figures 2; references 5: 2 Russian, 3 Western.

UDC 581.143.6:633.511

**Cytogenic Variability of Cotton Callus Tissue Cells**

907C0283A Kiev BIOPOLIMERY I KLETKA in Russian Vol 5 No 5, Sep-Oct 89 (manuscript received 5 Jul 88) pp 96-99

[Article by O. Ya. Vesmanova, S. N. Zuyeva, and A.-K. E. Ergashev, Institute for Experimental Biology of Plants, UzSSR Academy of Sciences, Tashkent]

[Abstract] Cytological peculiarities were studied in hypocotyle callus cells from *Gossypium arboreum* var. *salvimum* L. during 16 cell culture passages, each of 21 days duration. The cultures were a homogeneous population of undifferentiated cells with occasional differentiated portions. Isolated, elongated spiral tracheal cells and rings of 5-10 cells were seen in passages 1-2. Vascular bundles were seen in later passages, with their numbers increasing with passage number. Large starch-filled cells were also seen, which became more frequent in later passages. Compact, fine, intensely staining cells that resembled meristem were encountered, which are probably the morphogenesis zone. Anaphase analysis demonstrated that the number of aberrant cells increased with passage number, with both chromatide and chromosomal aberrations seen. Cariological metaphase analysis revealed genome destabilization, with an increase in tetraploid cells. The high level of heterogeneity in cell composition and chromosome number observed may be due to heterogeneity of the initial tissue culture cells, particularly in phytohormone levels. Figures 1; references 10: 5 Russian, 5 Western.

UDC 616.98:578.828.6]-022.363

# HIV-Infection: Venerologic Aspects of the Problem

907C0400A Moscow TERAPEVTICHESKIY ARKHIV  
in Russian Vol 61 No 10, Oct 89 (manuscript received  
2 Aug 88) pp 73-76

[Article by V.I. Pokrovskiy, N.S. Potekayev, V.V. Pokrovskiy, B.I. Zudin, T.I. Irova, and Ye.A. Shuginina (Moscow)]

[Text] The common characteristics shared by the mode of transmission of HIV infections and other sexually transmitted diseases (STD) contribute to the body's simultaneous infection by several etiological agents. The nature of the reciprocal effect of infections caused by these etiological agents in the body of the afflicted person has thus far been little studied. J. Weber and coauthors [4, 5], in their studies of HIV seropositive homosexuals, found that the probability of this infection progressing to AIDS are enhanced by the STDs which are the most frequent infectious diseases found among patients of this group. The Working Group on AIDS Immunology organized by WHO and the International Union of Immunological Societies' Committee on Clinical Immunology [1] also indicated that STDs play a role in heightening the risk of HIV-infection progression to AIDS if such diseases are localized in the areas penetrated by this virus. On the other hand, immunity suppression in HIV-infection patients doubtless affects STDs with the result that course and clinical manifestations of the STDs frequently acquire unusual forms. These circumstances give rise to complex and difficult problems in the diagnosis of such patients as well as in their management and treatment, particularly when HIV infection is combined with syphilis. In particular, D. Johns and co-investigators [3] reported four observations of neurosyphilis (two cases of cerebral vascular syphilis, 1 case of acute syphilitic meningitis, and one case of asymptomatic neurosyphilis) among young homosexuals who had HIV seropositive readings. Two of those patients who were initially diagnosed with primary and secondary syphilis were of particular interest. In accordance with these stages of the disease the patients received a full course treatment of benzyl penicillin. However, one of the patients developed neurosyphilis 4 months after treatment and the other developed the same thing 5 years after treatment. In the two other patients manifestations of syphilis were diagnosed when the nervous system was affected. The authors believe that by suppressing immunity (especially cellular immunity), the HIV infection contributed to the syphilitic lesion of the nervous system and a severe course of neurosyphilis. They therefore recommend that neurosyphilis be included into the growing list of AIDS warning symptoms.

Distribution of Patients By Age and Diagnosis

Stage of syphilis	Age, years						
	24	28	31	37	40	40	44
	Sex						
	m	m	m	m	f	m	m
Early latent	-	-	-	-	+	-	-
Secondary recurrent	+	+	+	-	-	-	+
Late latent	-	-	-	+	-	+	-

C.L. Berry and coauthors [2] reported the unsuccessful attempt to treat a 26-year-old HIV-infected homosexual with secondary syphilis by employing traditional doses of benzyl penicillin. In spite of the good initial clinical and serological dynamics, 5 months after the initial treatment the patient developed meningovascular syphilis with severe neurological disturbances.

The authors of both publications emphasize the possible tragic consequences of CNS *Treponema pallidum* infection in HIV-infected patients, and believe that current methods of treating syphilis are inadequate for arresting syphilis in patients of this kind.

Our own literature lacks any publications on the combination of HIV infection and syphilis. We therefore thought it would be possible to share our experience in the detection, management, and treatment of syphilis in HIV-infected patients.

We observed six men (four were natives of Central Africa, and two were citizens of our country) and one woman (a citizen of our country). Our diagnosis of HIV infection was confirmed in all of the patients by immuno-enzyme tests employing the Abbott (USA) test system. We detected syphilis in five men during tests for this disease (examination, express testing and comprehensive serological reactions - CSR) with HIV infections. Two of the patients (a man and a woman) were diagnosed with syphilis, and upon a subsequent examination, were diagnosed with an HIV infection. The diagnosis of syphilis was later confirmed by positive readings of immunofluorescent-200, FTA-ABS, RIBT, or the presence of *Treponema* in the tissue fluid of syphilids. The distribution of patients by sex, age, and stages of syphilis infection is given in the Table.

We were not able to establish the sources of syphilis infection. Three of the men indicated that they had numerous relations with different women both in our country as well as abroad, and that they had been afflicted with gonorrhea on a number of occasions. One man admitted sexual intimacy with only one woman in his own country three years prior to the time he came under our observation. Two other men suffered from psychosexual orientation disturbances. The woman indicated that she had an extended sexual relationship with

a foreigner two years ago. All of the patients denied any intravenous or any other method of taking narcotics or receiving blood transfusions. Upon clinical examination we found enlarged occipital, submaxillary, supraclavicular, subclavian, cervical, axillary, ulnar, and inguinal lymph nodes. The number of enlarged node groups and the combination of these groups in patients were variable. All of the nodes were painless and mobile upon palpation. They were of a dense elastic consistency with sizes ranging from a pea to a walnut. The subnodal skin was unaltered. It should be noted that the woman had the largest inguinal lymph nodes. The inguinal lymph nodes in the men were either smaller than the upper nodes or were not enlarged at all. In view of the positive HIV serological findings and the enlarged lymph nodes, all of the patients were diagnosed as being in the "lymphadenopathic stage of HIV infection." The patients with latent late syphilis and HIV infection were deported with a recommendation that they be treated in their own country. Five patients received anti-syphilis treatment, and three of those patients are presently under our observation. Case I. Male, 24 years, engaged in sexual relations with a woman in his own country three years ago. HIV seropositive. Manifestations of secondary recurrent syphilis exhibited by regressing papules in the perianal region only. Complement fixation test (CFT) yielded a positive result with an ultrasonic Treponema antigen in a 1/10 titer and in a 1/20 cardiolipin titer, RIBT (radio immuno-blot test) 75 percent, immunofluorescent-200 4+. Treponema pallidum was not detected in the papular tissue fluid. A spinal fluid tap was not taken. Treatment consisted of 500,000 units of sodium benzyl penicillin eight times a day for 28 days. Start of treatment was accompanied by a slight exacerbation reaction with a subfebrile temperature. The syphilitic papules completely regressed by the end of the treatment period. The patient was deported after the completion of treatment.

Case II. Male, 44 years. History of numerous relations with women, including prostitutes. Previously had gonorrhea. HIV seropositive. Manifestations of secondary recurrent syphilis exhibited by papules and pustules on the trunk skin, especially the genitalia. Elements were in the stage of regression. CFT with ultrasonic Treponema and cardiolipin antigens 4+ at a 1/80 dilution, RIBT 100 percent, radioimmunofluorescent-200 and FTA-ABS 4+. T. pallidum was not detected in the papular or pustular tissue fluid. No spinal tap was taken. Treatment consisted of 500,000 units of sodium benzyl penicillin eight times a day for 28 days. Start of treatment was accompanied by a slight reaction with subfebrile temperature. Manifestations of syphilis on the skin completely regressed on the 16th day of treatment. Patient was deported following treatment.

Case III. Female, 40 years, married for the third time. An mandatory syphilis test at her place of employment yielded a positive blood serum CFT result (CFT with cardiolipin and Treponema antigens positive (4+) at a 1/80 dilution). Positive syphilis serum reaction was

confirmed by immunofluorescent-200, FTA-ABS, RIBT, and TPHA. An HIV blood test was positive. Mucous eruptions on the skin were not detected. CSR and HIV virus antibody tests of the patient's husband were negative. The patient was diagnosed as having "early latent syphilis and HIV infection." The patient refused a spinal tap. Treatment was initiated with 500,000 units of sodium benzyl penicillin eight times daily for 7 days. Six hours after the start of treatment the patient developed a pronounced acute exacerbation reaction lasting six hours with body temperature elevated to 38.9°C. There were no trunk skin eruptions. For the next 28 days the patient received 600,000 units of novocaine benzyl penicillin twice a day. The patient received a total dosage of 62,600,000 units of penicillin which she tolerated well. Blood serology tests after the completion of treatment: CSR positive (CFT with cardiolipin and Treponema antigens positive at a 1/20 dilution). Two months after the completion of the treatment blood serum CSR was positive. Blood serum CSR was positive five months after therapy. The patient is still under our observation.

Case IV. Male, 31 years, bachelor. Began active sexual activity at age of 17. Engaged in homosexual relations (from five to ten times a year). Four months prior to his admission to the clinic he noticed skin pruritis and eruptions. He went to a dermatology-venerologic dispensary (DVD) in his neighborhood for a consultation. There he was given a CSR test which was negative and a diagnosis of dermatitis. The rash disappeared after a few days. Two months later he noticed a few nodal elements on his upper chest and right hip. After a second visit to the DVD the CSR blood tests were positive and the patient was sent to a venereal disease hospital. An examination at the hospital detected only a few papular skin eruptions on the forehead and inguinal lymphadenitis. The patient was diagnosed as having early latent syphilis which was confirmed by positive CSR, RIF and RIBT tests. Treatment was begun with 1,000,000 units of sodium benzyl penicillin six times a day. There was no exacerbation reaction. Therapy was well tolerated. The patient came under our observation after positive serological data indicated the presence of an HIV infection. An examination of the patient in our division revealed clustered, dense, circular papules up to 0.3 cm in size on the left half of the forehead and upper part of the head. The papules had a smooth surface, were of a cyanotic-pink color and dense elastic consistency. There were two similar elements on the upper left chest. No other skin or mucous eruptions were detected. The nature of the indicated nodal elements was not quite clear. We decided to undertake a histomorphological test of the nodal elements. The test results showed that there was no epidermal alteration. All layers of the dermis had pronounced productive vasculites with perivascular infiltrates from lymphoid and plasma cells. We concluded that the observed alterations were characteristic of syphilis [Fig. 1 (see insert for figures 1-4)]. Diagnosis: secondary recurrent syphilis. HIV infection. The patient

received a course of treatment in accordance with procedures of the USSR Ministry of Health, and is under our observation.

Case V. Male, 28 years, bachelor. Bisexual. Came under our observation in connection with positive tests for HIV infection. Our laboratory examination results: erythematous angina, roseolo-papular eruption on the trunk, forearms, and soles (urticaria and follicular roseola, lenticular syphilid, ring-like plantar syphilis - Fig. 2). The anterior surface of the penis base had scar with distinctly outlined circles 1.5 cm in diameter. Below the scar on the anterior surface of the penis there were linearly located three circular nodal edematous elements up to 0.3 cm in size of a cyanotic-rose color with a slight infiltrate at the base with scant desquamation on the surface. One must emphasize that a large number of T. pallidum was detected in the serum of the indicated papular elements. Slightly infiltrated patches up to 1.0 cm in diameter and hemorrhagic eruptions (Fig. 3) were found on the lateral surfaces of both shins positioned linearly in the form of a chain. A histomorphological examination was undertaken to clarify the nature of the indicated elements.

Conclusion: Insignificant epidermal parakeratosis and endothelial vacuolization in the Malpighian layer; edema in the dermal surface layers. We observed a large number of vessels with thickened walls and obliterated lumen due to endothelial proliferation, a pronounced perivascular infiltration from lymph and plasma cells. The detected productive vasculites and perivasculites were characteristic of secondary syphilis (Fig. 4). In addition, we found pointed anal condyloma and mycosis of the feet. Our diagnosis of secondary syphilis was confirmed by positive CSR readings (CFT with cardiolipin and Treponema antigens (4+) at a 1/80 dilution), radioimmunofluorescent-200 and FTA-ABS 4+, and RIBT 100 percent. A spinal tap prior to beginning syphilis treatment revealed cytos of 26 per 1 mm<sup>3</sup>, protein at 0.6 percent, CSR positive (4+), RIF-s positive (4+), and RIBT at 52 percent. In view of the patient's medical history indicating his inability to tolerate penicillin, he was given a daily dose of 1.5 g of erythromycin for 30 days. There was no exacerbation reaction. A regression of erythematous angina, and roseola-papular eruptions on the trunk, sex organ, extremities, and soles of the feet was noted by the 17th day of treatment.

Our final diagnosis: Secondary recurrent syphilis, HIV infection, pointed condyloma, and plantar mycosis. After three weeks the patient was again admitted to our department for an examination. There were no syphilitic eruptions on the skin or mucous membranes. A CSR blood test was positive (CFT with cardiolipin antigen was positive (4+) at a 1/20 dilution). A second spinal tap test: protein 0.85 percent, cytos 0, Lange reaction 66644332. The neuropathologist concluded that the patient had asymptomatic neurosyphilis. In connection with the fact that the nervous system was involved in the infection process, in spite of the patient's indication that he could not tolerate penicillin in the past, we decided to

undertake a course of treatment with penicillin group preparations. Treatment was initiated employing the protection of antihistamine preparations and the administration of 1,000,000 units of sodium benzyl penicillin six times a day. Beginning with the eighth day novocaine benzyl penicillin was administered at a dose of 600,000 units twice a day along with ethamide at a dose of 1.05 g four times a day. The patient tolerated this treatment well. Observation of the patient continues. CSR was positive upon his discharge. Thus, there are some special characteristics in the course and clinical aspects of syphilis infections in persons with HIV infections: A reduction in the time required for the development of the secondary period (case IV), unusual clinical manifestations (cases IV and V), and early syphilitic involvement of the nervous system (case V). In view of the literature data spinal taps should be made of all persons with this type of combined infection. The treatment of patients with syphilis at any stage who are also HIV-infected should be undertaken vigorously with the use of preparations that enhance penicillin penetration into the spinal fluid. All patients with HIV infections must be examined for the presence of syphilis by employing the entire set of serological tests, and vice versa.

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UDC 616.36-002-022:578.891/-036.2-078.83

#### Frequency of Identification of Hepatitis B Markers in Specific Regions of USSR

907c0048D Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 5, May 89 (manuscript received 13 Mar 88) pp 106-107

[Article by L. K. Kozhevnikova, A. A. Asratyan, G. A. Danilina and Ye. N. Khokhlova, Scientific Research Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow]



[Abstract] An analysis was undertaken of 1983-1985 epidemiologic data to determine the incidence of hepatitis B markers (HBsAg and anti-HBs antibodies) among the adult and pediatric populations in Moscow, Baku, and Fergana. The data showed that in Moscow the incidence of HBsAg positive adults was 1.6%, vs. 0.6% for children. An analogous relationship was obtained for anti-HB positive individuals: 20.5% adults and 8.4% children. In general, adult infectivity (22.1%) was much greater than that for children (9.0%). In Baku the percentage of HBsAg positive adults (2.9%) and children (3.0%) was essentially equal, with a significant difference between anti-HB positive adults (17.3%) and children (8.3%). The overall incidence of hepatitis B in Baku among adults and children was, respectively, 20.2 and 11.3%. In Fergana the percentage of HBsAg positive children (6.9%) exceeded that for positive adults (2.7%), whereas anti-HB positive adults (21.2%) exceeded the numbers of positive children (12.3%). The adult and pediatric morbidities in Fergana were similar with respective figures of 23.9 and 19.2%. These findings underscored uneven distribution of hepatitis B markers among adults and children in different regions of the USSR that are known to vary in hepatitis B morbidity patterns.

616.36-002.7:578.891]-022.363-3-036.22

#### **Epidemiology of Non-A, Non-B Viral Hepatitis with Fecal-Oral Route of Transmission**

907c0048C Moscow *ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII* in Russian No 5, May 89 (manuscript received 30 Jun 88) pp 42-47

[Article by P. A. Khukhlovich, I. V. Shakhildyan, Yu. P. Solodovnikov, M. I. Narkevich, A. Ye. Nedachin, M. O. Favorov, A. V. Sychev, S. N. Kuzin, S. A. Arakelov, G. K. Zairov, T. L. Yashina, G. F. Kurbanova, L. R. Abdullayeva, Kh. K. Ishniyazov and K. B. Berdyayev, Institute of Virology imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences; Central Scientific Research Institute of Epidemiology, USSR Ministry of Health, Moscow]

[Abstract] A retrospective epidemiologic survey was conducted in one region of the Turkmen SSR on non-A, non-B (NA-NB) hepatitis with fecal-oral route of transmission for the period 1974-1985. Graphic presentation of the statistical data on viral hepatitis revealed high morbidity peaks in 1977 (tenfold higher than in the previous years) and again in 1984-1985 (five- to eightfold higher than in 1980-1983). In addition, a special feature of both outbreaks was the particularly high incidence of viral hepatitis in the 20-29 and 15-19 age groups. Serological studies and electron microscopy of fecal samples demonstrated that the NA-NB type of viral hepatitis was the predominant pathology in the 15- to 19-year-olds and the 20- to 29-year-olds and, thus, was responsible for their prominence in the disease spectrum. The survey also demonstrates that these two age groups are particularly prone to drinking unboiled water

in the hot summer months and, accordingly, are at special risk of infection with the type of NA-NB viral hepatitis transmitted by the oral-fecal route. Figures 3; references 14: 5 Russian, 9 Western.

UDC 616.98:579.871.1]-036.22(470+571)

#### **Epidemic Process of Diphtherial Infection in RSFSR Since Introduction of Epidemiological Inspection**

907C0048B Moscow *ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII* in Russian No 5, May 89 (manuscript received 30 Mar 88) pp 38-42

[Article by S. S. Markina, I. M. Tymchakovskaya, N. M. Maksimova and I. L. Sukhorukova, Moscow Scientific Research Institute of Epidemiology and Microbiology imeni G. N. Gabrichevskiy and Main Sanitary-Epidemiologic Administration, RSFSR Ministry of Health]

[Abstract] A comparison of epidemiologic data on diphtheria in the RSFSR for the periods 1979-1982 and 1983-1986 revealed a 2.8-fold increase in the incidence and a fourfold increase in mortality in the latter time frame in the 68 territories under analysis. This change was attributed to implementation of more accurate and complete methods of detection and analysis, which also increased the number of positive territories from 67% in 1982 to 95% in 1986. Although in the majority of the regions only sporadic cases are reported, in 20-31% there are annual occurrences of diphtheria. Furthermore, the incidence has been shown to be two- to threefold higher in urban areas than in rural regions, and adults continue to account for 70% of the cases. As a result of an active immunization campaign, 1986 witnessed a reduction in the incidence of diphtheria along the entire age spectrum, which was most pronounced in the 30-39 group (three- to fourfold decrease). Beginning with 1986, mortality showed a downward trend, decreasing twofold in 1987 in comparison with the previous year. However, carriers continue to remain a serious problem. The number of carriers actually increased twofold in comparison with 1977-1982, with children accounting for 54.2-59.7% of the carrier population. References 8: 4 Russian, 4 Western.

UDC 616.36-002-022:578.891]-036.2-07(575.1)

#### **Regional-Age Characteristics of the Distribution of Non-A, Non-B Viral Hepatitis With Fecal-Oral Route of Infection in Regions of Uzbek SSR With Elevated Morbidity Due to Viral Hepatitis**

907C0048A Moscow *ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII* in Russian No 5, May 89 (manuscript received 8 Apr 88) pp 35-38

[Article by G. I. Makarova, Uzbek Branch, Institute of Virology imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences, Tashkent]

[Abstract] Epidemiologic status of non-A, non-B (NA-NB) viral hepatitis with the fecal-oral transmission route

was assessed in areas with high morbidity due to viral hepatitis in Uzbekistan, based exclusion of HBsAg and anti-hepatitic A virus IgM. The study was based on analyses carried out on 707 serum samples in fall of 1985-1986 that were obtained in ten rural regions and Tashkent. The results demonstrated that NA-NB hepatitis accounted for 46.8% (25-67%) of the cases, followed by hepatitis A (33.6%), and hepatitis B (14.8%). The data also demonstrated that the proportion of NA-NB cases is on the increase in Uzbekistan, with the highest burden falling in the 20-29 years age bracket (48.9%). Children accounted for 24.7% of the NA-NB morbidity, further defined as follows: 11.1% 2-4 years, 7.8% 5-9 years, and 5.9% 10-14 years. References 8: 2 Russian, 6 Western.

**Ixodid Ticks of Pavlodar Oblast and Their Involvement in Circulation of Tularemia Infection**

18402158 Leningrad PARAZITOLOGIYA in Russian  
Vol 23 No 3, May-Jun 89 (Manuscript received 4 Sep 87; after revision 18 Oct 88) pp 267-273

[Article by N. A. Amirova, V. I. Pakizh, M. A. Chepe-lyuk, V. G. Suprun, N. I. Sergeyeva, A. N. Tilik, Pavlodar Sanitary-Epidemiologic Station]

[Abstract] Summarizing materials from collections of ixodid ticks conducted since 1967, the authors report seven species of ixodid ticks found in Pavlodar Oblast—Ixodes crenulatus, I. laguri laguri, I. lividus, I. persulcatus, Dermacentor marginatus, D. reticulatus, and Haemaphysalis concinna. One imported species was also reported—Hyalomma asiaticum. A total of 221 cultures of the tularemia agent were isolated from the ticks, which were collected in a region of the steppe zone that has a severely continental climate whose winter and summer temperatures differ by some 80°. In terms of relief, vegetation, and animal population, the region has six types of terrain-ecology sectors. A regional map indicating the distribution of the ticks is provided, and the activity of the ticks and their participation in epizootics are described. Of the seven indigenous species discussed, the most numerous are three pasture species: D. marginatus, D. reticulatus and H. concinna. These species are quite significant in the structure of natural tularemia foci and are constantly involved in the circulation of the tularemia pathogen in the environment. Most active in this respect is H. concinna. Figures 2; references 21 (Russian).

UDC 577.2

**Mutant Hly Determinants of E. Coli Induced by Hydroxylamine Treatment of Recombinant Plasmids**

907c0023A Moscow DOKLADY AKADEMII NAUK  
SSSR in Russian Vol 307 No 3, Jul 89 (manuscript  
received 17 Nov 88) pp 732-736

[Article by O. K. Shulyupin, I. I. Fodor, V. P. Polyanin, E. A. Svetoch and K. I. Volkovoy, Institute of Biochemistry and Physiology of Microorganisms, USSR Academy of Sciences, Pushchino, Moscow Oblast; All-Union Scientific Research Institute of Applied Microbiology, Obolensk, Moscow Oblast]

[Abstract] Random point mutations were introduced into the hly operon of E. coli via treatment of recombinant plasmids with hydroxylamine in order to obtain a system showing enhanced secretion of gene products. The hydroxylamine-treated DNA of plasmids pH1 (Ap<sup>r</sup>, Hly) and pH2 (Ap<sup>r</sup>, Hly) were subsequently used for transformation of E. coli P678-54, C600, and Aa125. Strain Aa125 was found capable of transforming premutational damage induced in vitro by hydroxylamine treatment in the cloned hly operon into mutations rendering cells bearing the Hly<sup>-</sup> plasmids nontoxic for CBA mice. This approach also opens new vistas to assessment of the structure-activity features of the hly operon, since lysis of sheep red cells by the E. coli cells did not necessarily correlate with toxicity for mice. Figures 1; references 14: 3 Russian, 11 Western.

UDC 579.252.2:577.21

**Transformation of Chlamydomonads with Plasmids Bearing Chlamydomonad Nuclear DNA Fragments**

907c0024A Moscow DOKLADY AKADEMII NAUK  
SSSR in Russian Vol 307 No 4, Aug 89 (manuscript  
received 20 Dec 88) pp 992-995

[Article by I. A. Sizova, T. V. Lapina, T. G. Klochkova and A. V. Kozlov, Leningrad State University]

[Abstract] Testing studies were conducted with novel vectors for the transformation of Chlamydomonas reinhardtii 302 cw15arg7-8mt(+), with the intention of eventual use of chlamydomonads as cloning systems for foreign genes. Transformation was conducted with plasmids bearing the yeast arg4 gene (arginine succinate lyase) and random inserts of chlamydomonad nuclear DNA. Analysis of the transformants by molecular hybridization and bacterial marker salvage method indicated a transformant yield of 1-10 per 10 µg plasmid DNA, significantly exceeding the level of spontaneous reversions of the mutant arg7-8 gene. On balance, the data demonstrated that plasmids designated as pBR325arg4, pBR327arg4, and pSV2neo, bearing sequences of chlamydomonad nuclear DNA, were capable of transforming Chl. reinhardtii. The transformed cells carried the autonomous recombinant plasmids for 88 days on media selective for the plasmid marker. However, the plasmids were structurally unstable, a factor that will have to be overcome before they can be used for cloning in chlamydomonads. Figures 2; references 11: 2 Russian, 9 Western.

UDC 612.112.94.017.1.014.46

**Adsorption of Polyelectrolyte on Surface of Lymphoid Cell: Differences Between Polycation and Polyanion**

907C0022D Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 307 No 2, Jul 89 (manuscript received 7 Dec 88) pp 504-506

[Article by I. S. Fevraleva, O. L. Pospelova, B. D. Sviridov, A. V. Nekrasov, R. I. Ataullakhanov and R. M. Khaitov, Institute of Immunology, Moscow]

[Abstract] An analysis was made of the adsorption pattern of polyelectrolytes to mouse splenic cells in order to assess charge distribution on the target cells. In the case of both glass-adsorbed cells and cells in suspension luminescent microscopy demonstrated that with fluorescent-labeled polycationic polymer (poly-L-lysine,  $2.6 \times 10^5$  D) polar adsorption ( $2-3 \mu\text{m}$ ) was seen in 65% of the cells, with 30% of the cells displaying two or more smaller ( $0.2-3 \mu\text{m}$ ) poles. Polyanionic polymer (polyacrylic acid,  $4 \times 10^5$  D) showed uniform adsorption over the surface of the splenocytes. Studies with transformed K-562 cells showed in 90% of the cells the polycation was adsorbed uniformly over the surface, with uniform adsorption also seen in 50% of Jurkat T-lymphoma cells; in the remaining cells in both cases polar adsorption was observed. These findings suggest that negatively charged groups have a polar distribution on the surface of lymphoid cells and that the distribution is affected by neoplastic transformation. Figures 2; references 9: 7 Russian, 2 Western.

UDC 612.017.1.014.46:[615.371:579.852.11].08

**Role of Humoral and Cellular Factors in Formation of Postvaccination Immunity to Anthrax in Mice**

907c0048E Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 5, May 89 (manuscript received 1 Mar 88) pp 108-109

[Article by V. A. Abalakin, Central Scientific Research Institute of Epidemiology, USSR Ministry of Health, Moscow]

[Abstract] With the discovery of the complex exotoxin Bacillus anthracis and of its leading role in pathogenesis and the induction of specific immunity, researchers assumed that humoral, antitoxin immunity played a big part in the formation of acquired resistance. But it soon became apparent that the presence of antibodies to the toxin's PA and LF do not guarantee resistance to highly virulent strains. Based on the assumption that cellular immunity plays a key role in acquired resistance to anthrax, the researchers here set out to analyze the role played by humoral and cellular factors of acquired immunity in male  $F_1$  (CBA x C57BL) mice (18-20 g, 10-12 weeks old) immunized with a PA preparation and

a preparation of inactivated vegetative cells ( $100 \times 10^6$  cfu in a 1:1 mixture with Freund's adjuvant) and treated with cyclophosphane and an antianthrax globulin. Immunization of the mice with PA demonstrated a dose-dependent relationship in terms of acquired immunity ( $40 \mu\text{g}$  PA resulted in immunity to anthrax in 100% of cases, whereas  $28 \mu\text{g}$  was associated with resistance in only 40%). The higher dose was accompanied by 100% seroconversion and marked edema of the paw. Subcutaneous injection of cyclophosphane 48 hours before immunization completely prevented the seroconversion, enhanced edema, and lowered acquired resistance. Immunization with  $18 \mu\text{g}$  PA had no effect on seroconversion or edema. Cyclophosphane injection in the mice immunized with the lower dose of PA dropped the figures for infection resistance to 11%, eliminated seroconversion, and increased edema. The resistance brought about by a subpreventive dose of the globulin in mice immunized with the inactivated vegetative cells indicates that the cellular response induced by thermostable somatic antigen creates a certain level of protection. Cellular immunity was found to account for 30% of acquired resistance, with humoral, antitoxin immunity responsible for 70%. Somatic protein is partially responsible for the cellular immunity.

UDC 616.3/351-006.6-07

**Ultrastructural Immunocytochemical Diagnosis of Squamous-Cell Carcinoma of the Digestive Tract**

18402156 Leningrad VOPROSY ONKOLOGII in Russian Vol 35 No 5, May 89 (Manuscript received 3 Jul 87) pp 589-594

[Article by D. G. Silagadze, L. V. Beletskaya, T. V. Chelidze, E. I. Drobyshvskaya, U. A. Gabuniya, I. M. Lyampert, Institute of Experimental Morphology imeni A. N. Natishvili, GSSR Academy of Sciences, Tbilisi; Scientific Research Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow]

[Abstract] Accurate diagnosis of certain neoplasms is difficult because of problems associated with, for example, the need to determine the nature of their tissue. The techniques of immunological and structural analysis that are used in modern oncology have made it possible to identify specific markers—organ-specific and tissue-specific antigens. The use of various immunocytochemical methods is important not only for accurate diagnosis, but also for the tracking of subcellular localization of such antigens. The researchers here used immunofluorescence and enzyme immunoassay with A-6/2 monoclonal antibodies for human basal-cell antigen to identify the basal-cell antigen of squamous-cell carcinoma of the digestive tract in 27 individuals. They established that basal-cell antigen is preserved in the cells of squamous-cell carcinoma in various locations and with various degrees of differentiation, but is not found in tumors of other origin. The results indicated that the localization of basal-cell antigen at the cellular and subcellular levels in

squamous-cell carcinoma of the digestive tract is the same as in squamous-cell carcinomas of other organs. The use of ultrastructural immune assay that employs A-6/2 monoclonal antibodies for tissue-specific antigen can facilitate precise diagnosis in cases of poorly differentiated forms of squamous-cell carcinoma that are otherwise difficult to diagnosis. Figures 2; references 15: 14 Russian, 1 Western.

UDC 616.98:578.828-6]-078.73

### **Comparative Evaluation of Enzyme Immunoassays Used for Identifying HIV Antibodies**

18400614 Moscow *GEMATOLOGIYA I TRANSFUZIOLOGIYA in Russian Vol 34 No 5, May 89 (Manuscript received 29 Feb 88) pp 49-52*

[Article by Professor T. V. Golosova, A. N. Margolina, and T. A. Tupoleva, All-Union Hematologic Science Center, USSR Ministry of Health, Moscow]

[Abstract] A comparative study is presented of the quality of Soviet enzyme immunoassays (Antigen, Peptoskrin, Vektor) and western systems (from the United States, Great Britain, FRG, Holland, and France) designed to identify HIV antibodies. Specificity and sensitivity were studied on specially made and coded slides with 100 serum samples tested beforehand with EIA (twelve contained HIV antibodies). The Antigen and Peptoskrin systems, as well as the Dutch (Vironostika), French (Elavia), and British (Velkom) systems, correctly identified the 12 positive samples. There were no false positives. Of the classical EIA systems, the French Elavia system and the U.S. Ortho system were the most sensitive systems in a study of titers of eight seropositive samples (1:3000 and 1:1000, respectively). Among the other nonclassical systems, the West German Bering system identified seropositive sera with an average titer of 1:480, followed closely by the Velkom system (1:400) and by the Vektor system (1:20). In addition, 1,582 samples from previously untested blood donors underwent parallel testing. In the primary screening, HIV antibodies were found in 0.25% of cases by the Antigen system, in 0.19% by the Peptoskrin system, and in 0.22% by the Velkom system. The Dutch

system identified antibodies in 0.06% of cases, and the Elavia system identified no antibodies. Repeat testing dropped the positive results to 0.06% in the Antigen and Vironostika systems, with no positives found by the other systems. The classical EIAs took 2.5-3 hours to produce a result and required preliminary dilution of the sera. The nonclassical EIAs require no preliminary dilution, which speeds the process. The Soviet EIA judged to have the greatest sensitivity and specificity for identifying HIV antibodies was the Antigen system; the most sensitive, specific foreign system was the French Elavia system. Figures 2; References 6: 1 Russian, 5 Western.

UDC 615.384:221].015.46.612.017.1

### **Immunotropic Effects of Perfluorodecalin and Perfluorotributylamine**

18400537A Moscow *KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 23 No 2, Feb 89 (manuscript received 20 Jun 88) pp 135-139*

[Abstract] Male CBA and male and female and outbred mice were used in testing perfluorodecalin (I) and perfluorotributylamine (II) for their effects on the immune system and hexobarbital-induced sleep. Two intraperitoneal administrations of I or II (2.5 to 25 mg/kg/day) at one day interval resulted in a dose-dependent depression of both splenic antibody-forming and rosette-forming cells in mice immunized intraperitoneally with sheep erythrocytes. Compound I was most inhibitory when administered 4 days prior to the antigenic stimulus, and II when given 10 days before immunization. Immune recovery after I was observed to occur in 10-12 days, and after the administration of II in 18-20 days. Serum hemolysin levels were little affected by I or II; significant reduction in lytic activity were only obtained with the highest doses of I and II. Both agents diminished the duration of hexobarbital-induced sleep. The effects were most pronounced within 4-9 days, but persisted for at least 42 days. These observation demonstrated that although the blood substitutes I and II are not metabolized, they possess biological activity, a factor that may complicate their therapeutic applications. Figures 2; tables 1; references 25: 9 Russian, 16 Western.

UDC 547.963.32.057:577.113.4:535.217

**Laser Activation of Incorporated Oligonucleotide Reagent for Targeted Modification of Nucleic Acid**

18400538E Moscow BIOORGANICHESKAYA  
KHIMIYA in Russian Vol 15 No 3, Mar 89 (manuscript  
received 5 Mar 88, in revised form 2 Aug 88)  
pp 387-391

[Article by S. I. Oshevskiy, Institute of Cytology and  
Genetics, Siberian Department, USSR Academy of Sci-  
ences, Novosibirsk]

[Abstract] A study was conducted to determine the feasibility of laser activation of alkylating oligonucleotide reagents after complementary complex formation with the DNA target. The reagent in question was represented by the nitrogen mustard residue coupled to the 5'-thiophosphate group of an oligodeoxyribonucleotide. The use of a target DNA 48 bases long and activation with nitrogen laser (337 nm) yielded a product modified at T<sup>24</sup>, which was complementary to the 5'-terminal adenosine of the oligonucleotide reagent. To a lesser extent, the adjacent bases G<sup>26</sup> and G<sup>27</sup> were also modified. In analogy to previous studies, it appears that the mechanism of activation involves the 2-chloroethylamino group and subsequent alkylation of the target bases. The results were different from those

obtained when activation involved reduction with borohydride. Figures 2; references 18: 13 Russian, 5 Western.

UDC 615.214.31.015.4:616.89-008.46].076.9

**Device for Measurement of Power Output of Visible Lasers**

907C0167E Moscow BYULLETEN  
EKSPERIMENTALNOY BIOLOGII I MEDITSINY  
in Russian Vol 107 No 6, Jun 89 (manuscript received  
10 Oct 88) pp 695-696

[Article by Z. T. Bikbulatov, V. G. Samusev and V. P. Tsoy, Laboratory of Lymphology, Institute of Physiology, Siberian Branch, USSR Academy of Medical Sciences, Novosibirsk]

[Abstract] In view of the large size and relative insensitivity of currently available devices (IMO-2, IMO-2N) for the measurement of laser power output, a schematic is presented for the design of a simple, inexpensive, and sensitive device that utilizes components manufactured in the USSR. The device, specifically designed to operate at 400-700 nm, consists of a measurement head and electronics circuitry that relies on an SFZ [not further expanded] silicon photoresistor, a thermal-compensation photoresistor, an operational amplifier, and a 15 V current supply. Figures 2; references 2 (Russian).

UDC 612.822.1+577.15/17

**Analysis of Significance of Low-Molecular Peptides in the Regulation of Human Motor Functions in Certain CNS Diseases***907C00211 Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I. M. SECHENOV in Russian Vol 75 No 5, May 89 (manuscript received 14 Jul 88) pp 697-701*

[Article by A.G. Naryshkin, F.A. Gurchin and S. A. Dambinova, Scientific Research Institute of Experimental Medicine, USSR Academy of Medical Sciences, Leningrad]

[Abstract] Gel chromatography of plasma derived from 12 patients with motor disorders due to CNS lesions (including Parkinsonism) revealed a different distribution pattern for small peptides, i.e., less than 10,000 D, from that seen in plasma of healthy donors. The primary differences consisted of the appearance of a novel peak in patient plasma corresponding to 5000-6000 D peptides, and an increase in 2000-3000 D components, concomitantly with the disappearance of a peak representing 2000-2500 D components. Therapeutic trials with 3 administrations of different autologous peptide fractions via lumbar puncture at 7- to 15-day intervals yielded subjective improvements (attitude, memory, attention span) for 2-3 weeks, with the improvements evident within a day of treatment. Maximum benefit was evident 7-10 days after treatment. Objective improvements were represented by alleviation of rigidity, hypokinesia, and postural disorders and, to a lesser extent, of tremor. The clinical improvements were more noticeable in the more severely affected patients and were evident earlier in the proximal musculature. The best therapeutic benefit was obtained with the 2000-2500 D fraction, while the 5000-10,000 D fraction was entirely ineffective. Figures 2; references 12: 11 Russian, 1 Western.

UDC612.13:577.15/17

**Effects of Substance P and its N-Terminal Fragment (NTF) on Microcirculation in Control and Stress Situations***9007c0021J Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I. M. SECHENOV in Russian Vol 75 No 5, May 89 (manuscript received 13 Jul 88) pp 709-714*

[Article by M. P. Gorizontova, Laboratory of General Pathology of Microcirculation, Scientific Research Institute of General Pathology and Pathologic Physiology, USSR Academy of Medical Sciences, Moscow]

[Abstract] A comparative evaluation was conducted on the microcirculatory effects of substance P (SP) and its N-terminal fragment, SP<sub>1-4</sub>. The microscopic observations were conducted on the mesentery circulation of 200-250 g male Wistar rats. Direct application studies demonstrated that SP, in concentrations of  $7 \times 10^{-9}$  to  $7$

$\times 10^{-6}$ , inhibited mast cell degranulation, increased venule permeability, and facilitated leukocytic lining. SP<sub>1-4</sub> was 0.007th as effective as SP, taking the activity of SP as equal to 1, in terms of permeability and lining, and 0.0007th as effective in inducing mast cell degranulation. Animal immobilization studies showed that intraperitoneal administration of 125  $\mu\text{g/kg}$  SP 5 h before the stress potentiated the adverse effects of immobilization on mesenteric microcirculation and enhanced degranulation. However, administration of an equivalent dose of SP<sub>1-4</sub> under identical conditions prevented adverse changes in 50% of the animals, and was correlated with the tranquilizing action of this fragment. Figures 4; references 12: 4 Russian, 8 Western.

UDC 577.346

**Detoxication With Polyvinylpyrrolidone in Alcoholic Intoxication***907C0020 Tbilisi SOOBSHCHENIYA AKADEMII NAUK GRUZINSKOY SSR in Russian Vol 134 No 3, Jun 89 (manuscript received 9 Jan 88) pp 621-624*

[Article by G. Sh. Davitaya, S. Sh. Metskhvarishvili, B. A. Lomsadze, P. G. Nishnianidze, O. A. Koridze, E. N. Shengelaya, T. M. Karaputadze, Yu. E. Kirsh and G. A. Frangulyan, Tbilisi State University]

[Abstract] Polyvinylpyrrolidone (PVP) preparations with MWs of 12,000, 20,000 and 40,000 were tested for their effects in ethanol intoxication in outbred white rats, alcoholic patients, and blood obtained from healthy donors. The laboratory data demonstrated that animals given 1 ml 75% ethanol per os generally succumbed within an hour, whereas piggyback administration of 1 ml of PVP markedly enhanced the survival rate and the physiological status of the rats. Blood chemistries on the patients, donors, and rats demonstrated that alcohol intake was accompanied by depression of lipid peroxidation, alkaline phosphatase activity, prostaglandin E, and cAMP and inhibition of hemolysis. Addition of PVP to blood to a concentration of  $10^{-4}$  M PVP reversed the ethanol-induced trends. These findings indicated that the ethanol-mediated changes were due to inhibition of the prostaglandin cascade, with PVP exerting a detoxifying effect via activation of prostaglandin biosynthesis. References 11: 8 Russian, 3 Western.

**'Computer Dermograph' Used in Diagnostic Center***907C0150 Moscow MEDITSINSKAYA GAZETA in Russian 30 Jul 89 p 4*

[Article by A. Prozorova, TASS correspondent, Vladivostok, under the rubric "What Scientists Are Working On": "The Diagnostician is a Computerized Dermograph"]

[Abstract] A novel medical institute is being established in Vladivostok that will be unique for several reasons. One is that it will have no departmental affiliations, and

the second is that it will be the only institution in the world devoted to "computer dermatography." The concept of computer dermatography was developed by V. Solomonov, A. Rybchenko, G. Shabanov and Yu. Ponomarev at the data processing center of the health care department of the Primorskiy Kray ispolkom, in conjunction with the kray clinical hospital. It offers a unique means to systematic diagnosis. The approach rests on evaluation of spinal reflexes via analysis of cutaneous resistance over bioactive points in the various dermatomes or points of innervation, providing a phasic readout of changes in conductivity or ionic permeability at the selected sites. Patterns of activity have been shown to exhibit diurnal cycles reflecting variations in the functional cycles of the various tissue and organ systems. This methodology and the instruments that have been constructed are in the process of undergoing clinical trials at several clinical facilities, with the results to date fully supporting theoretical conclusions as to the utility of computer dermatography in clinical medicine. An agreement has been signed with the "Dalnepribor" instrumental plant in Vladivostok for the production of experimental models of the apparatus, and interest in the instrumentation has been displayed by foreign firms.

UDC 616-001.4-003.9-092.9-07:[616.154:577.175.823]-074

#### **Interrelationship Between Serotonin and Products of Lipid Peroxidation in Experimental Wound Healing**

907C0167D Moscow BYULLETEN  
EKSPERIMENTALNOY BIOLOGII I MEDITSINY  
in Russian Vol 107 No 6, Jun 89 (manuscript received  
23 Jun 88) pp 690-693

[Article by V. V. Zakharov, L. A. Mamedov, S. A. Meshcheryakova, A. B. Shekhter, N. I. Kapitonov, Ye. N. Goncharenko, T. I. Gudzh, Ch. R. Ragimov and A. Yu. Agayev, First Moscow Medical Institute imeni I. M. Sechenov]

[Abstract] Male Wistar rats, 190-210 g, were employed in experiments designed to assess the role of serotonin and lipid peroxidation in wound healing, using surgical full-thickness 400 mm<sup>2</sup> aseptic and infected wounds. Comparison of blood serotonin and hydrogen peroxide levels in animals with aseptic and infected wounds demonstrated that suppuration involved markedly enhanced oxidative deamination of biogenic amines, activation of lipid peroxidation, membrane damage and reduction in the activity of membrane-bound monoamine oxidases, and inhibition of antioxidant mechanisms. The beneficial effect of per os 2-isonicotinoylhydrazide (20 mg/kg) in promoting wound healing was attributed to enhancement of superoxide dismutase activity and the attendant diminution in products of lipid peroxidation, and inhibition of monoamine oxidase which served to maintain serotonin levels. Figures 2; references 16; 11 Russian, 5 Western.

#### **Manufacture of Ultrasound Equipment by Cooperative**

907C0147A Moscow MEDITSINSKAYA GAZETA  
in Russian 9 Jul 89 p 1

[Article by N. Nazarovich, TASS correspondent, Mogilev, under the rubric "Pulse": "Physicists Under Contract to the Medical Profession"]

[Abstract] The "Mikron" cooperative in Mogilev has started small-scale production of an ultrasonic apparatus that can take one's pulse and measure body temperature and be used in ultrasonic acupuncture. The instrument was designed at the Mogilev Branch of the Institute of Physics of the Belorussian SSR Academy of Sciences. Despite great interest on the part of physicians and patients, none of the industrial concerns that had been contacted demonstrated any interest in the large-scale manufacturing of this novel device. As a result, the "Mikron" cooperative of physicists was founded to manufacture and market the device.

#### **Equipment for Sharpening Disposable Needles Described**

907C0147C Moscow MEDITSINSKAYA GAZETA  
in Russian 10 Sep 89 p 1

[Unattributed article picked up from TASS, Orsha, under the rubric "Pulse": "Automatic Unit Sharpens Needles"]

[Abstract] The Krasnyy Borets plant in Orsha has already delivered the first shipments of equipment for sharpening disposable needles to Vorsma and Tyumen. The equipment can sharpen approximately 180,000 needles per hour. The quality of the equipment is on a par with equipment manufactured abroad.

#### **Self-Financing Considered for Institute**

907C0147D Moscow MEDITSINSKAYA GAZETA  
in Russian 28 Jul 89 p 3

[Unattributed article under the rubric "In the Presidium of the USSR Academy of Medical Sciences": "Official Department"]

[Abstract] An extended meeting of the presidium of the USSR Academy of Medical Sciences considered a report by V. I. Burakovskiy, director of the Institute of Cardiovascular Surgery imeni A. N. Bakulev, on self-financing at the institute. Discussion of the pros and cons revolved around the feasibility of establishing self-financing at research institutes, and the broader issue of whether self-financing would have a deleterious effect on basic research. There was a general consensus that, strictly speaking, self-financing is not an accurate description of the type of financial accountability that is currently being implemented at academic institutions. A decision was made to seek additional guidance and support from the USSR Ministry of Health and conduct close quarterly monitoring and annual evaluation of progress in terms of clinical and research results.



UDC 579.861.2[579.222:615.919].04:612.017.  
1+612.017.1.014.46:579.861.2:[579.222:615.919

**Immunobiological Properties of Staphylococcal Enterotoxins A, B, C, D and E**

907C0167H Moscow BYULLETEN

EKSPERIMENTALNOY BIOLOGII I MEDITSINY  
in Russian Vol 107 No 6, Jun 89 (manuscript received  
15 Oct 88) pp 720-722

[Article by M. L. Beylbayeva, R. D. Aspetov, Yu. V. Yezepchuk and I. G. Tsoy, Scientific Research Institute of Epidemiology, Microbiology and Infectious Diseases, Kazakh SSR Ministry of Health, Alma-Ata; Scientific

Research Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow]

[Abstract] An analysis was conducted on the mitogenic and interferon-inducing potential of staphylococcal enterotoxins A, B, C, D, and E. Studies with lymphocytes obtained from donor blood demonstrated that enterotoxin D possessed the greatest degree of mitogenic activity, exceeding even that of phytohemagglutinin and Con A. The remaining enterotoxins were essentially equivalent to phytohemagglutinin and Con A in their mitogenic activities. Studies on the induction of interferon revealed that enterotoxin A stimulated the highest levels of gamma-interferon. In general, the enterotoxins exceeded phytohemagglutinin and Con A as inducers. References 7: 5 Russian, 2 Western.

UDC 355.34:612.821.08-06:616-001-031.13

**Psychophysiological Prognosis of Occupational Success**

907c0049B Moscow VOYENNO-MEDITSINSKIY  
in Russian No 5, May 89 pp 55-56

[Article by Candidate of Biological Sciences Yu. Ye. Lyakh, docent, and Candidate of Medical Sciences L. P. Seredenko]

[Abstract] Psychophysiological testing was conducted on 96 healthy trainees 20-25 years old at a higher military school in order to assess the validity of the testing techniques in predicting suitability for operational-type assignments. Correlation analysis on the results of the test and actual performance for the men yielded a correlation coefficient of  $r = 0.6-0.8$ . The outcome indicated that assessment of the rate of information processing, sensorimotor reaction time, galvanic skin response, tracking studies, and other psychophysiological parameters provide adequate indication of eventual job performance. The testing was repeated after three years on the same contingent of subjects and provided further confirmation of the validity of this approach in military occupational guidance. References 6 (Russian).

UDC 616.2-008.4-036.11-06:616-001-031.13

**Diagnosis and Treatment of Acute Respiratory Insufficiency in Multiple Injuries**

907C0049A Moscow VOYENNO-MEDITSINSKIY  
in Russian No 5, May 89 pp 24-26

[Article by M. M. Kirillov, professor, colonel, Medical Corps]

[Abstract] An analysis was conducted of the pathogenetic factors leading to acute respiratory insufficiency (ARI) in 400 cases of multiple injuries. The clinical study revealed that in patients with chest trauma the most serious deterioration of respiratory function occurred within the first ten days of trauma and that patients with thoracic trauma were much more susceptible to ARI. In 60% of the chest cases acid-base disorders were diagnosed as largely due to either respiratory or metabolic acidosis. Respiratory alkalosis was generally late in onset—after ten days—in conjunction with hypostatic pneumonia and was directly attributable to hyperventilation and intensive transfusion therapy. Equally significant in the pathogenesis of ARI are activation of the coagulation system, intoxication, and compromised function of intercostal musculature in nonthoracic trauma. Therapeutic measures for ARI are essentially resuscitative and supportive in nature, based on the implicated pathogenetic mechanisms. References 8 (Russian).

UDC 539.193;577.153

**Determination of Acetylcholine Substrate Conformation by Molecular Mechanics Approach**

18400538D Moscow BIOORGANICHESKAYA  
KHIMIYA in Russian Vol 15 No 3, Mar 89 (manuscript  
received 26 Jul 88) pp 335-344

[Article by N. N. Shestakova, Ye. V. Rozengart, A. Ye. Khovanskikh, B. S. Zhorov\* and B. A. Govyrin\*, Institutes of Evolutionary Physiology and Biochemistry imeni I. M. Sechenov and of \*Physiology imeni I. P. Pavlov, USSR Academy of Sciences, Leningrad]

[Abstract] Further studies were conducted on the spatial configuration of the active site of acetylcholinesterase (EC 3.1.1.7) via analysis of the conformational characteristics of a series of substrates by means of molecular mechanics. Trials with 23 putative substrates demonstrated a clear correlation ( $r = 0.79$ ) between tt-conformation of the substrate and the rate of hydrolysis by the enzyme. Substrates that were efficiently hydrolyzed showed low-energy conformers whose  $r_{O,N}$  distances did not differ by more than 0.1 Å from the acetylcholine tt-conformer, and the  $r_{C,N}$  distances by 0.2 Å or less. Furthermore, the majority of the substrates with the tt-conformation of acetylcholine were in the energetically most favored state. Cyclic analogs of acetylcholine with the desirable tt-conformation were those characterized by a O-C-C-N<sup>+</sup> torsion angle within the 120-240° range, and torsional angles C(O)-O-C-C- in the 156-202° range. Figures 4; tables 6; references 21: 4 Russian, 17 Western.

UDC 577.352(2+332)+547.963.4

**13-Cis- and All-Trans-Isomers of 11,12-Didehydrobacteriorhodopsin**

18400538A Moscow BIOORGANICHESKAYA  
KHIMIYA in Russian Vol 15 No 3, Mar 89 (manuscript  
received 15 Mar 88) pp 307-312

[Article by S. V. Danshina\*, A. L. Drachev, L. A. Kaulen, B. I. Mitsner\*\*, L. V. Khitrina and A. A. Khodonov\*\*, Interfaculty Special Problems Scientific Research Laboratory of Molecular Biology and Bioorganic Chemistry imeni A. N. Belozerskiy, Moscow State University imeni M. V. Lomonosov; \*Institute of Biological Physics, USSR Academy of Sciences, Pushchino, Moscow Oblast; \*\*Moscow Institute of Fine Chemical Technology imeni M. V. Lomonosov]

[Abstract] Optical absorption studies on 13-cis- and all-trans-isomers of 11,12-didehydroretinal, an analog of retinal containing a triple bond at C-11 in lieu of a double bond, demonstrated the formation of a chromoprotein with bacteriorhodopsin that is active in photocycle reactions. However, thermo- and photoisomerization in the latter type of chromoprotein did not proceed as efficiently as in bacteriorhodopsin. Illumination of the all-trans-11,12-didehydrobacteriorhodopsin (DDBR)

leads to isomerization of the double bond at C-13. In addition, on exposure to light 11,12-DDBR is transformed into a form with a photocycle that differs from that of the all-trans- and the 13-cis-forms, containing more than one long-wavelength intermediate compounds. The photoresponses obtained at various wavelengths demonstrate that all-trans-11,12-DDBR is transformed into at least two form by exposure to light. Furthermore, illumination with constant light from a halogen lamp leads predominantly to the accumulation of the 13-cis-isomer, while 5-15 laser flashes (532 nm,  $t_{1/2}$ ) leads to the accumulation of an alternate form. Finally, the all-trans-11,12-DDBR function in proton transport. Figures 5; tables 1; references 16: 8 Russian, 8 Western.

UDC 577.113.4

**Producing a Viable Variant of the M13 Phage With a Foreign Peptide Incorporated Into the B-Protein**

907C0022A Moscow DOKLADY AKADEMII NAUK  
SSSR in Russian Vol 307 No 2, Jul 89 (manuscript  
received 23 Dec 88) pp 481-483

[Article by A. A. Ilyichev, O. O. Minenkova, S. I. Tatkov, N. N. Karpyshev, A. M. Yeroshkin, V. A. Petrenko and USSR Academy of Sciences Corresponding Member L. S. Sandakhchev, Scientific Research Design and Engineering Institute of Biologically Active Substances, Berdsk, Novosibirsk Oblast; All-Union Scientific Research Institute of Molecular Biology, Koltsovo, Novosibirsk Oblast]

[Abstract] B-protein of bacteriophage M13 was modified by inclusion of a foreign peptide segment in order to determine the suitability of M13, bearing foreign epitopes, to function as synthetic immunogens. A recombinant M13 was constructed bearing a synthetic DNA fragment encoding the pentapeptide DHLMP, followed by amplification in *E. coli* to yield M13 bacteriophage bearing DHLMP in the N-terminal sequence of the B-protein. The resultant phage (M13BOL) contained an additional 10% of foreign amino acids. M13BOL multiplied normally in the bacterial cells with the phage yield reduced by an order of magnitude and twofold reduction in the concentration of ssDNA isolated from a stationary culture. These findings demonstrated that insertion of a foreign peptide into the B-protein had an insignificant effect on phage particle yield, but seriously affected infectivity. Nevertheless, the key observation was that M13 retains viability following incorporation of a foreign peptide into the N-terminal portion of the B-protein. Figures 1; references 15: 8 Russian, 7 Western.

UDC 577.212.175.3

**Synthesis and Secretion of Hybrid Polypeptide Bearing Bovine ACTH by Escherichia coli**

907C0023D Moscow DOKLADY AKADEMII NAUK  
SSSR in Russian Vol 307 No 3, Jul 89 (manuscript  
received 19 Dec 88) pp 751-754

[Article by A. Sh. Parsadyanyan, V. Ye. Karapetyan, P. M. Rubtsov, K. G. Skryabin and ArmSSR Academy of

Sciences Academician A. A. Galoyan, Institute of Biochemistry, Armenian SSR Academy of Sciences, Yerevan; Institute of Molecular Biology imeni V. A. Engelgardt, USSR Academy of Sciences, Moscow]

[Abstract] Techniques utilizing vectors based on expression of the protein A gene of *Staphylococcus aureus* in *Escherichia coli* were applied to the synthesis of a chimeric protein bearing the bovine ACTH sequence [Abrahmsen, L., et al., NUCL. ACIDS RES., 14:7487, 1986]. The expression vectors were constructed from plasmid pAP carrying the major portion of the protein A

gene, bearing the 5 immunoglobulin binding domains. A fragment of the cDNA of proopiomelanocortin encoding ACTH was joined to the protein A gene fragment via a synthetic adaptor. *E. coli* K802 transformed by plasmids pAP18/ProACTH2 and pAP/ProACTH2 synthesized polypeptides binding to IgG-Sepharose and bearing the ACTH segment. The yield was approximately 4 mg/L culture. Radioimmunoassays showed that 98% of the peptide was secreted into the periplasmic zone, with less than 2% remaining in the cytoplasm. Figures 3; references 9: 1 Russian, 8 Western.

UDC 613.648:613.68]-07

**An Experimental Complex for Studying the Biological Effect of UHF Radiation of Ship-Based Radar Stations***907C0027 Moscow GIGIYENA TRUDA I  
PROFESSIONALNYYE ZABOLEVANIYA in Russian  
No 5, May 89 pp 49-50*

[Article by A. V. Grigorenko, A. V. Diyeu, and A. A. Vasilyev, Institute of Water Transportation Hygiene, USSR Ministry of Health, Moscow]

[Text] Optimization of the living environment stands in the forefront of the hygiene problems created in the navy by scientific and technical progress. One of the main ways of solving that problem is to establish standards for the shipboard factors that affect individuals.

In connection with the expanded use of sources of electromagnetic radiation of ultrahigh frequency (UHF) aboard ships, there has been a sharp growth in the contingent whose irradiation is not associated with the servicing of electronic equipment; no maximum allowable levels, however, have been worked out for this category of individuals.

The development of scientifically valid standards of UHF exposure for ship crews encounters a number of difficulties that hinder the establishment of a clearcut dose-effect relationship. First, there is the complexity of the configuration of propagation of the radiation aboard ship, the secondary emissions from the deck and metal structures, and the constant change in the irradiation conditions and operation. Second, there are no instruments for measuring near-zone UHF radiation or the intermittent and pulsating operations that are characteristic of ship-based radars. Nor are the measurement techniques advanced enough to enable any semblance of exact dosimetry.<sup>4</sup> Third, there are the many biotropic factors in the shipboard environment and the nonspecificity of the disorders in those exposed to UHF radiation.<sup>3, 6</sup>

Accordingly, validation of the maximum allowable levels (MAL) of UHF radiation requires experimental research in laboratory conditions that ensure the isolated action of a factor, stability of irradiation conditions, and dosimetry with the requisite degree of accuracy. The parameters of the radiation should be as close as possible to actual parameters. For that, an experimental complex was developed and built, consisting of an anechoic chamber and systems for irradiation, dosimetry, observation, and recording of medical and biological data.

The basic component of the complex is a 6.7 x 2.5 x 2.5 m anechoic chamber designed to create "free space" conditions.<sup>1, 2</sup> The size of the chamber is dictated by the requirements of the irradiation system and the necessity of conducting experiments that involve the participation of people.

The welded framework of the chamber is assembled from angle iron and encased in sheet iron 0.5 mm thick and butt-welded. Inside, the entire surface of the chamber is coated with radio-absorbing material (RAM) consisting of noncombustible tiles. In the wavelength range of 0.8-4 cm, the RAM that is used ensures a power reflection no greater than 3%. Because of the brittleness of the RAM, the floor of the chamber is further covered with sheet plexiglass that is 1 cm thick and is transparent to UHF radiation. A chair made of the same sheet plexiglass is placed in the irradiation zone for the test subject.

Built into the walls of the chamber are a 20-channel plug for the system for recording the medical and biological data, plugs for connecting the testing devices, and a two-way intercom system, all of which is sealed with structures made of RAM. The chamber is lighted by incandescent lamps that are "recessed" in the RAM layer. Thus, in the irradiation zone, there is no distortion of the propagation of the microwaves by radio-reflecting objects.

The irradiation system is an R-722-2 ship radar, which ensures that the parameters of the radiation in the experiment correspond to those on an actual ship. The carrier frequency of the radar is 9430 +/- 30 MHz (3.2 cm). The radiation is emitted in pulses. The pulse duration is 0.05  $\mu$ s at a repetition frequency of 4 kHz; 0.2  $\mu$ s at 2 kHz; 0.5  $\mu$ s at 1 kHz. There is a smooth regulation of the pulse output power of the radiation emitter in the range of 0-7 kW. A special diaphragm that interrupts the irradiation 10-20 times per minute simulates the rotation of the radar antenna.

Coming from the UHF emitter is a waveguide transmission line that has a cross section of 12.6 x 28.5 mm and consists of a set of standard sections of varying shape. The irradiation is achieved with an open waveguide. The emission wave zone is formed at a distance of 20 cm from the flange. In the vertical plane (E-polarization), the width of the radiation pattern is 60°. The distance to the irradiation zone and, thus, the area of the zone with a given nonuniformity can be varied. The energy flux density achieved depends on both the emitted power and the distance and is selected in accordance with the goals of each particular experiment.

A measurement antenna is mounted in a special structure of RAM and plexiglass in the irradiation zone in the end wall of the chamber at a height of 1.5 m above the floor. For the dosimetry, the MZ-40 pulse wattmeter is used, which records the absorbed power and is capable of measuring radiation with typical intermittent and pulsed radar operation in the far zone. The measured power values are then converted to scale.

Observation of the test subject during the experiment is accomplished by means of a PTU-47 television set located in the "dead zone."

For recording electrophysiological data during the emission of UHF radiation, artefact-free electrode systems of

various designs are installed, depending on the purpose of the experiments<sup>5</sup>. Signals are sent to the input of an amplifier through a special 16-channel plug. After amplification, the signals are sent to the input of a 16-channel commutator of a 12-bit analog-digital converter that is connected to a microcomputer.

**CONCLUSION.** An experimental complex has been created that makes it possible to investigate the degree of biological action of UHF radiation with parameters typical of ship radars and that is necessary for substantiating the maximum allowable levels of UHF irradiation of the crew.

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UDC 615.846.015.46:612.017.1].076.9

#### **Influence of Repeated Local Microwave Exposure on Immunohormonal Indices in Intact Animals**

18402128 Moscow VOPROSY KURORTOLOGII  
FIZIOTERAPII I LECHEBNOY FIZICHESKOY  
KULTURY in Russian No 2, Mar-Apr 89 (Manuscript  
received 11 Aug 88) pp 54-57

[Article by I. D. Frenkel, S. B. Pershin, Z. A. Sokolova, A. I. Galenchik, Ye. G. Korovkina, All-Union Science Center of Medical Rehabilitation and Physical Therapy, USSR Ministry of Public Health, Moscow]

[Abstract] A number of authors have demonstrated the possibility of immunomodulation by decimeter (microwave) electromagnetic radiation directed at the endocrine glands. Experiments on 135 rabbits involved irradiation of the thyroid and adrenal glands. Microwave irradiation of the thyroid was found to change the hormonal ratios in the animals after two exposures. Adrenal cortex activity dropped after two to eight procedures and normalized after exposure was stopped. The studies indicate that microwave radiation of the adrenals can change the functional activity of the endocrine glands. Proliferative processes in the lymph tissue were stimulated. References 7: 6 Russian, 1 Western.

UDC 616-092.9:576.8.097.3

**Antioxidant Effect of Antitumor Antibiotic Obtained from Plant of Compositae Family**

18400642B Kiev UKRAINSKIY BIOKHMICHESKIY ZHURNAL in Russian Vol 61 No 3, May-Jun 89 (Manuscript received 13 Apr 88) pp 117-119

[Article by V. V. Smirnov, Ye. L. Mishenkova, V. A. Baraboy, G. T. Petrenko, N. N. Volynets, Institute of Microbiology and Virology imeni D. K. Zabolotnyy, Ukrainian Academy of Sciences, Kiev; Kiev Institute of Roentgenology, Radiology and Oncology, Ukrainian Ministry of Health]

[Abstract] The effect that the antitumor antibiotic known as preparation 6, which is obtained from a plant of the compositae family, has on the intensity of free-radical oxidation of lipids was studied. Because of its broad range of antitumor action and lack of toxicity for animals, preparation 6 (P6) has been suggested for clinical testing in the treatment of malignant neoplasms. In laboratory tests, 100 male rats (150-180 g) were given single doses of P6 of 25 and 50 mg/kg perorally. In studying the effect on spontaneous chemiluminescence of substance 2f, the primary component of P6 and the component that is responsible for the antitumor effect of P6, the researchers established that the behavior of P6 in the body of the healthy rats either had no effect on the intensity of spontaneous chemiluminescence of the blood plasma or moderately reduced it. When the animals were subjected to stress, the use of P6 was found to suppress the formation of peroxides and free radicals in blood plasma. The intensity of free-radical oxidation of lipids was found to decrease by a factor of 6 and stabilize at the normal level under conditions of emotional and pain-related stress when P6 was used. Dose-dependent inhibition of oxidative reactions was observed in the laboratory animals. Preparation 6 has antioxidant activity and its effect is comparable to that of  $\alpha$ -tocopherol (vitamin E). References 6 (Russian).

UDC 615.281.8:547.728.2].012.1].07

**Synthesis and Antiviral Activity of 2-Benzyl[isobutyl]-5-Hydroxybenzofuran Derivatives**

907C0236F Moscow  
KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 23 No 7, Jul 89 (manuscript received 25 May 88) pp 843-847

[Article by V. M. Lyubchanskaya, V. S. Velezheva, I. S. Nikolayeva, Ye. A. Golovanova, L. M. Alekseyeva and A. N. Fomina, All-Union Scientific Research Institute of Pharmaceutical Chemistry imeni S. Ordzhonikidze, Moscow]

[Abstract] A series twelve 2-benzyl- and 2-isobutyl-5-hydroxybenzylfurans were synthesized and tested for antiviral activity in tissue culture and in vivo

on mice. Five of the 5-hydroxybenzofurans were found effective in inhibiting CPE in chick embryo fibroblast tissue culture on infection with influenza virus A/FPV (H7N7). In addition, three agents were effective in protecting the tissue culture cells from VEE strain 230; two compounds active against VEE were also active against the influenza virus. However, none of these agents were active against herpes simplex type I virus, or in animal trials on mice infected with influenza virus A/Bethesda/63 (H2N2) and treated per os with the 5-hydroxyfurans. In the final analysis, the data demonstrated that some of the 5-hydroxyfurans were effective against influenza and VEE and, thus, possess a broader antiviral spectrum than 5-methoxybenzofurans that are active only against VEE. References 4: 3 Russian, 1 Western.

UDC 615.849.015.25.547.789.1].012.1

**Synthesis and Radioprotective Properties of 2-Amino-4-Oxo-5-Aminomethyl[ethyl]-Thiazolines**

907C0236E Moscow  
KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 23 No 7, Jul 89 (manuscript received 1 Mar 88) pp 832-834

[Article by A. A. Mandrugun, A. A. Rodyunin, V. M. Fedoseyev, M. M. Konstantinova, G. V. Dontsova and O. N. Rakhmanina, Chemical Faculty, Moscow State University imeni M. V. Lomonosov; Institute of Developmental Biology imeni N. K. Koltsov, USSR Academy of Sciences, Moscow]

[Abstract] cursory details are provided on the synthesis of 2-amino-4-oxo-5-aminomethyl-thiazoline (I) and 2-amino-4-oxo-5-aminoethyl-thiazoline (II) for toxicity and radioprotective studies. Trials on (CBA x C57Bl)F<sub>1</sub> male and female mice showed that compound I lacked toxicity even in a dose of 1360 mg/kg, whereas the LD<sub>50</sub> for compound II was 1130 mg/kg. Neither compound was radioprotective when administered prior to 9.5 Gy gamma-radiation or 8.8 Gy x-irradiation. However, compound II evidenced hemopoietic protectiveness on x-irradiation with 5 or 7.5 Gy doses, a phenomenon that may be a factor in improved survival rates at those doses. Figures 3; references 4 (Russian).

UDC 615.33:577.152.321].014.47

**Properties of Lysozyme Immobilized on Cellulose and Polycapraamide Carriers**

907C0236G Moscow  
KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 23 No 7, Jul 89 (manuscript received 27 Apr 88) pp 868-870

[Article by T. Ye. Ignatyuk, V. V. Ryltsev, Ye. O. Medusheva, V. N. Filatov and I. N. Yegorova, All-Union Scientific Research Institute of the Textile and Clothing Industry, Moscow]

[Abstract] An analysis was conducted on the results obtained in covalent coupling of lysozyme to dialdehyde cellulose (I) and glutaraldehyde-activated polycapromamide (II), with a view toward preparation of bacteriolytic dressings. In general, results with immobilization on I were found to be superior to those obtained with II. When coupling was conducted at pH 7.0 the enzymatic activity of the lysozyme immobilized on I was 230 U/g, and that of the lysozyme-II preparation 38 U/g. In addition, immobilization on I yielded a dressing less susceptible to loss of enzymatic activity on sterilization by gamma irradiation (30% loss of activity for I, 45% for II), and that retained a higher level of enzymatic activity after storage in a buffer for 24 h at room temperature (27% loss of activity for I, and 42% for II). Figures 2; references 10 (Russian).

UDC 616.155.1+616.155.25]-02:678.744.322]-074

### Membrane-Stabilizing Properties of Hydroxykalkylammonium Salts of Fe-Polyacrylic Acid

907C0236D Moscow

KHIMIKO-FARMATSEVTICHESKIY ZHURNAL  
in Russian Vol 23 No 7, Jul 89 (manuscript received  
13 Jun 88) pp 830-832

[Article by V. B. Kazimirovskaya, T. V. Nefedova, V. M. Annenkova, V. Z. Annenkova and M. G. Voronkov, Institute of Organic Chemistry, Siberian Branch, USSR Academy of Sciences, Irkutsk]

[Abstract] In vitro and in vivo trials were conducted to assess the erythrocyte-stabilizing properties of dimethyl-, and di- and triethanolammoniates of Fe-polyacrylic acid. Incubation of erythrocytes derived from rabbit venous blood with these agents at 37°C for 15 min enhanced their stability to 0.0002 N sulfuric acid, 0.007% saponin, and 0.4 W/cm<sup>2</sup> ultrasound. The stabilizing effect was dependent on both the chemical nature of the agent and the concentration (0.001-100 µg/ml), with the triethanolammonium salt showing the highest degree of protection (16-39%). In addition, studies with intravenous administration of 0.5 mg/kg of the diethylammoniate demonstrated the in vivo efficacy of this agent in enhancing erythrocyte stability when subsequently tested in vitro. References 9 (Russian).

UDC 615.31:547.466.3].012.1

### Synthesis and Pharmacodynamics of -Carboxypropylamides of Higher Fatty Acids

907C0236C Moscow

KHIMIKO-FARMATSEVTICHESKIY ZHURNAL  
in Russian Vol 23 No 7, Jul 89 (manuscript received  
10 May 88) pp 817-819

[Article by V. E. Ashirova, S. M. Alekseyeva, R. P. Yevstigneyeva, I. K. Sarycheva, I. S. Morozov, A. S. Losev and L. M. Shmuylovich, Moscow Institute of Fine Chemical Technology imeni M. V. Lomonosov]

[Abstract] Cursory technical details are provided on the synthesis of γ-carboxypropylamides of higher fatty acids intended to serve as carriers of GABA across the blood-brain barrier. The resultant GABA-palmitate (I), GABA-laurinate (II), and GABA-linoleate (III) were tested on CBWA for effects on rectal temperature and tolerance of hypoxia. Administration of these agents (250 mg/kg, i.p. in Twin-80) resulted in marked hypothermia for 30 min, which was most pronounced in the case of II (> 5°C, p < 0.001). For the next 3.5 h the effects of these agents were variable, reflecting the differences in the lipophilic radicals. Determinations of survival rates following hypoxic episodes (20 min at an "altitude" of 11,000' m; ascent rate, 50 m/sec) showed that only preparation II possessed significant protective activity when given in a dose of 10 mg/kg one hour before hypoxia. Compound I was far less effective in a dose range of 1-100 mg/kg, while III was weakly protective in doses of 50-100 mg/kg. References 9: 7 Russian, 2 Western.

UDC 613.33-008.1-02:613.863]-092.9-085.362.438-039.71

### Protective Effect of Thympopentin Against Gastric Stress Injuries

907C0167C Moscow BYULLETEN

EKSPERIMENTALNOY BIOLOGII I MEDITSINY  
in Russian Vol 107 No 6, Jun 89 (manuscript received  
10 Oct 88) pp 673-675

[Article by T. A. Devyatkina, L. M. Tarasenko, V. Ye. Klusha, O. I. Tsebrzhinskiy, R. K. Mutseniyetse and I. R. Liyepa, Chairs of Pharmacology and of Biological Chemistry, Medical Stomatological Institute, Poltava; Laboratory of Peptide Pharmacology, Institute of Organic Synthesis, Latvian SSR Academy of Sciences, Riga]

[Abstract] Experimental therapeutic trials were conducted on 170-210 g male Wistar rats to evaluate the potential role of thymopentin in gastric ulcerogenesis. The model systems consisted of acute, chronic and a combination of acute-chronic stress relying on immobilization and immersion in 22°C water for 3 h, and various schedules of treatment with 100 µg/kg of thymopentin administered intraperitoneally. The resultant data demonstrated that in all cases thymopentin was an effective antiulcerogenic, reducing both the number of gastric ulcers (4-fold) and their severity (2.3-fold) and reversing thymic and adrenocortical involution. In addition, thymopentin administration facilitated a 3.3-fold increase in superoxide dismutase activity in the gastric tissue, a mechanism controlling the extent of lipid peroxidation and the generation of tissue-damaging products. These observations extend the scope of thymopentin pharmacodynamics and point to the role of peptide involvement in antioxidant systems. References 9 (Russian).



UDC 616.853-02:612.014.45]-092.9-086.  
213:577.175.325]-036.8

### Anticonvulsive Action of ACTH<sub>4-7</sub>Pro-Gly-Pro in Amygdalin Buildup and Audiogenic Epilepsy in Rats

907C0167F Moscow BYULLETEN

EKSPERIMENTALNOY BIOLOGII I MEDITSINY  
in Russian Vol 107 No 6, Jun 89 (manuscript received  
1 Jul 88) pp 702-704

[Article by S. A. Chepurinov, N. Ye. Chepurnova, M. V. Artyukhova, Ye. Yu. Kuznetsova, V. N. Nezavibatko and L. A. Andreyeva, Chair of Human and Animal Physiology, Moscow University imeni M. V. Lomonosov]

[Abstract] To assess the potential anticonvulsive effects of ACTH<sub>4-7</sub>Pro-Gly-Pro (ACTH-PGP), two rat models were employed. In one approach the effects of ACTH-PGP (50 µg/kg; i.p.) on the results of amygdalin buildup were compared with the effects of Nembutal (20 mg/kg) and calcium valproate (100 mg/kg) in 200-250 g outbred male rats. The resultant analysis of post-discharge patterns demonstrated that ACTH-PGP possessed anticonvulsive properties, both in terms of delay and inhibition. Additional studies on 150 g Krushinskiy-Molodkina rats with inherent predisposition to audiogenic epilepsy showed that pretreatment with ACTH-PGP (50 µg/kg; i.p.) yielded variable results. A single administration of ACTH-PGP 2 h before challenge with with a 112-dB auditory stimulus prevented convulsions. However, after a nine-month lag period a repeated single injection of ACTH-PGP was shown to enhance the percentage of rats responding with convulsions. Further continuation of ACTH-PGP on a daily basis resulted in a gradual abatement of the audiogenic responsiveness. These findings demonstrated that ACTH-PGP exerts variable effects on the various components entering into epileptogenesis. Figures 1; references 12: 6 Russian, 6 Western.

UDC 615.31:[575.95:547.943].015.4:[616.127-008.94:577.175.859]-02:613.863].076.9

### Effects of Enzyme-Resistant Leu-Enkephalin Analog on Myocardial Prostanoids in Stress- and Epinephrine-Induced Damage

907C0167G Moscow BYULLETEN

EKSPERIMENTALNOY BIOLOGII I MEDITSINY  
in Russian Vol 107 No 6, Jun 89 (manuscript received  
15 Oct 88) pp 704-706

[Article by Yu. B. Lishmanov, T. V. Fedotova and M. I. Titov, Laboratory of Radionuclide Research Methods, Scientific Research Institute of Cardiology, Tomsk Scientific Center, USSR Academy of Medical Sciences]

[Abstract] In order to better understand the mechanism by which dalargin, an enzyme-resistant leu-enkephalin analog, exerts its cardioprotective action, a study was conducted on the effects of dalargin on myocardial levels

of prostanoids and thromboxane-A<sub>2</sub>. The studies were conducted on 180-250 g outbred rats subjected to electrical stimulation or a single subcutaneous injection of epinephrine to induce cardiac damage. Afterwards the animals were treated intraperitoneally with 100 µg/kg dalargin. The results demonstrated that both forms of insult resulted in myocardial damage and lead to elevated myocardial levels of thromboxane A<sub>2</sub> and depression of prostanoid levels. Treatment with dalargin was seen to diminish 2- to 4.4-fold the rise in thromboxane concentration and stimulated a 1.8- to 2.7-fold increase in the prostanoid concentration over untreated stress levels. These observations suggest, then, that the cardioprotective action of dalargin is predicated on altering the thromboxane/prostanoid balance in the myocardium with a net positive effect on myocardial microcirculation, since thromboxane A<sub>2</sub> is a powerful vasoconstrictor. References 14: 10 Russian, 4 Western.

UDC 615.384.07

### Hemodynamic Effects of Pullulan in Relation to Pullulan Molecular Weight

907C0236A Moscow

KHIMIKO-FARMATSEVTICHESKIY ZHURNAL  
in Russian Vol 23 No 7, Jul 89 (manuscript received  
26 May 88) pp 789-794

[Article by G. S. Alekseyeva, T. N. Telkova, S. M. Yarovaya, A. Chlenov, V. A. Yanin and V. A. Dombrovskiy, All-Union Scientific Research Institute of Blood Substituent and Hormonal Preparation Technology, Moscow]

[Abstract] Studies were conducted on the molecular weight (MW) parameters of pullulan, a polysaccharide derived from Pullularia pullulans, to assess its potential as a plasma expander. In vitro studies in which pullulan preparations with initial average MWs of 51 (I), 60 (II), and 82 kD (III) were incubated with plasma demonstrated degradation to lower MW distribution spectrum. After 10 min of incubation the mean MW of preparation I was 33.4 kD, and after 24 h, 33.0 kD. The corresponding changes for II were 48.6 and 32.0 kD, and for III, 70.0 and 52.0 kD. Complete enzymatic hydrolysis with porcine pancreatic α-amylase yielded fractions with a mean MW of 30-35 kD with I, II, and III. In vivo studies on rabbits confirmed degradation of pullulan in the blood stream and demonstrated that preparation III had the longest half-life. Rapid elimination of preparations I and II was attributed to their rapid renal elimination in view of the 30 kD threshold for glomerular filtration. In hemorrhagic shock studies on dogs preparation III was effective in maintaining normal hemodynamics and myocardial function, while preparations I and II failed to do so. Nevertheless, all pullulan preparations ensured survival with blood loss limited to 30 ml/kg. These observations indicated that the higher MW pullulan preparations may have promise as plasma expanders, provided that coagulopathic complications

due to very high MW components can be excluded. Figures 2; references 11: 4 Russian, 7 Western.

UDC 615.214.3.012.1

### Pseudopeptide Analogs of TRH

907C0236B Moscow  
*KHIMIKO-FARMATSEVTICHESKIY ZHURNAL*  
in Russian Vol 23 No 7, Jul 89 (manuscript received  
10 May 88) pp 812-816

[Article by A. A. Mazurov, S. A. Andronati, T. I. Korotenko, T. A. Voronina and N. V. Markina, Physicochemical Institute imeni A. V. Bogatskiy, Ukrainian SSR Academy of Sciences, Odessa; Scientific Research Institute of Pharmacology, USSR Academy of Medical Sciences, Moscow]

[Abstract] A series of derivatized TRH analogs were synthesized and tested on 16-23 g outbred male mice for their psychotropic action spectrum. The final data revealed that replacement of the proline-NH<sub>2</sub> residue in TRH by adamantoylhydrazine or nicotinoylhydrazine residues results in agents with sedative and motor activity-inhibiting activities. Introduction of succinhydrazide led to agents that enhanced motor activity and possessed anti-amnesic effects, while blocking of the imidazole ring was accompanied by loss of psychotropic activities. None of the preparations functioned as antagonists of reserpine. However, it was noteworthy that N-(pyroglutamylhistidyl)-N'-( $\beta$ -carboxypropionyl)-hydrazine was 60 times more effective than piracetam as an anti-anamnestic agent. References 11: 4 Russian, 7 Western.

UDC 615.355:577.152.311].015.23.07

### Reversible Inhibition of Cholinesterases by Silatranes

18400537B Moscow  
*KHIMIKO-FARMATSEVTICHESKIY ZHURNAL*  
in Russian Vol 23 No 2, Feb 89 (manuscript received  
10 Dec 87) pp 170-172

[Article by Ye. V. Voronin, N. N. Kovalev, A. Ye. Khovanskikh, M. S. Sorokin and M. G. Voronkov, Institutes of Evolutionary Physiology and Biochemistry imeni I. M. Sechenov (Leningrad) and of Organic Chemistry (Irkutsk) USSR Academy of Sciences]

[Abstract] In order to expand the informational database on reversible inhibitors of cholinesterase and provide novel compounds with such activities testing was conducted with a number of silatranes. The kinetic studies were conducted with human erythrocytic acetylcholinesterase (AChE) and equine serum butyrylcholinesterase (BChE), employing silatranylmethyl derivatives of organic salts of sulfonium, selenonium, and telluronium, as well as trimethyl(silatran-1-ylmethyl)ammonium iodide. Every compound was found to function as a reversible inhibitor. The efficiency of the inhibitors did

not depend on the duration of incubation, but was reduced by dilution. In addition, most of the compounds were more efficient as inhibitors of AChE than of BChE. With AChE most of these compounds behaved as mixed-type inhibitors, and with BChE as competitive inhibitors. Tables 2; references 13: 11 Russian, 2 Western.

UDC 616.314.17-02:612.766.2]-085.31:546.185]-039.71

### Periodontal Changes Induced by Prolonged Hypodynamia and Use of Biphosphonates and Silatrane to Prevent Them

907C0056 Moscow *PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTALNAYA TERAPIYA* in Russian No 3, May-Jun 89 (manuscript received 29 Sep 87) pp 72-75

[Article by A. I. Volozhin and G. V. Amelkina, Chair of Pathologic Physiology, Stomatological Faculty, Moscow Medical Stomatological Institute imeni N. A. Semashko]

[Abstract] Male Wistar rats, 350-400 g in weight, were employed in a study designed to assess the effects of prolonged hypodynamia on the periodontium and correction of the changes by administration of the silatrane agent mival and the biphosphonates AMOK and EODF. The experimental design involved placing the animals in a semi-hanging position for 40 days. Pathomorphologic monitoring of the periodontium demonstrated that this condition led to marked atrophic changes in the alveolar processes, including formation of dentogingival pockets, fissure widening, and resorption of inter-radicular and intervalveolar septae of the molars. Administration of mival (10 mg/3 days) exerted both preventive and therapeutic effects. AMOK (0.81 mg/kg) was also seen to possess therapeutic efficacy and was more beneficial than EODF (20 mg/kg). Figures 2; references 12: 11 Russian, 1 Western.

UDC 547.245:678.048

### Stimulation of Liver Regeneration in Rats by Isopropoxygermatrane

907C0023E Moscow *DOKLADY AKADEMII NAUK SSSR* in Russian Vol 307 No 3, Jul 89 (manuscript received 26 Oct 88) pp 762-764

[Article by M. M. Rasulov, I. G. Kuznetsov, A. A. Belousov and USSR Academy of Sciences Corresponding Member M. G. Voronkov, Irkutsk Institute of Organic Chemistry, Siberian Department, USSR Academy of Sciences; All-Union Scientific Research and Engineering Institute of the Meat Industry, Moscow]

[Abstract] The demonstration that certain metaloatranes stimulate cell function led to an assessment of the effects of isopropoxygermatrane (IPG) on hepatocytes in the regenerating rat liver. Removal of two-thirds of the liver in 150-180 g outbred male rats was immediately followed by intraperitoneal administration of 40

mg/kg IPG; the injection was repeated after 24 h. Morphometric data demonstrated that IPG treatment led to a statistically significant increase in the area of the hepatocytes to  $650 \mu\text{m}^2$  from control values of  $450\text{-}460 \mu\text{m}^2$ . In addition, the count of mitotic cells reached an average of 39.5% following IPG administration versus a control

figure of 20-23%. A similarly significant elevation was seen in the experimental mitotic index vs. the control mitotic index (21 and 9.2-10.5, respectively). These changes were accompanied by an IPG-mediated reduction in hepatocytic oxygen uptake and inhibition of lipid peroxidation. Figures 1; references 10: 9 Russian, 1 Western.

UDC577.27

**Selective Elimination of Human T-Leukemic Cells with Ricin A-Chain Conjugated to Monoclonal Antibody Against T-Lymphocyte CD5 Antigen**

907c0025B Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 307 No 6, Aug 89 (manuscript received 28 Dec 88) pp 1507-1511

[Article by A. G. Tonevitskiy, A. Yu. Toptygin, U. Marks, A. V. Filatov and L. P. Alekseyev, All-Union Cardiological Scientific Center, USSR Academy of Medical Sciences; Institute of Immunology, Moscow]

[Abstract] Trials were conducted on the susceptibility of various cells lines to an immunotoxin prepared by conjugating the A chain of ricin to monoclonal antibody directed against the CD5 antigen of T-lymphocytes. Data on thymidine incorporation demonstrated that the immunotoxin was twice as cytotoxic against leukemic and normal cells bearing the CD5 antigen than against cells lacking the target antigen. In addition, the conjugate was also highly toxic for erythroblastoid K562 cells, with the effects attributed to the inherent susceptibility of these cells to ricin. The immunotoxin was thus shown to be highly selective for cells with the CD5 antigen, effectively eliminating both malignant and normal T-lymphocytes. Figures 4; references 14: 3 Russian, 11 Western.

UDC 591.089.612.8

**Immunohistochemical Studies of Differentiation of Embryonic Rat Neuroglial Transplants Placed in Brains of Mature Animals**

907C0025A Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 307 No 6, Aug 89 (manuscript received 30 Dec 88) pp 1487-1489

[Article by Ye. N. Kozlova, Institute of General Genetics imeni N. I. Vavilov, USSR Academy of Sciences, Moscow]

[Abstract] Immunohistochemical analysis was conducted on the rate of differentiation of glial elements of rat embryonic cortical tissue transplanted into the right somatosensory area of mature rats. The basic experimental design consisted of transplants derived from 17-day-old embryos transferred to 120 g female Wistar rats. Differentiation was monitored by fluorescent antibody detection of the rate of disappearance of vimentine (VIM) and appearance of glial acidic fibrillar protein (GAFF). Analysis of the data for the transplants and appropriate controls demonstrated that the rate of differentiation of the astrocyte population of the homotropic transplants proceeded at a rate that was some three- to four-times greater than normal for astrocytic elements. Furthermore, the transplanted cells never attained a normal course of differentiation but remained GAFF-reactive throughout the 35-day duration of the experiment. Figures 1; references 14 (Western).

UDC 591.112.1:591.543.42

**Cardiotropic Activity of Tissue Peptides from Hibernating Susliks**

907C0025C Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 307 No 6, Aug 89 (manuscript received 17 Nov 88) pp 1512-1514

[Article by G. S. Sukhova, V. G. Levashova, L. I. Kramarova, V. I. Svirayev, R. Kh. Ziganshin, S. G. Kolayeva, I. I. Mikhaleva and A. A. Povzun, Moscow State University imeni M. V. Lomonosov; Institutes of Bioorganic Chemistry imeni M. M. Shemyakin (Moscow) and of Biological Physics (Pushchino, Moscow Oblast), USSR Academy of Sciences]

[Abstract] Isolated heart preparations of the frog *Rana temporaria* were used in assessing the cardiotropic effects of peptides derived from the brain and small intestine of hibernating susliks (*Citellus undulatus*). The peptides, representing a mixture of molecules ranging in MW from  $10^3$  D, were inhibitory to the frog heart in a dose-dependent fashion. The frequency and amplitude of heart contractions diminished, with complete cardiac arrest attained with a peptide concentration of  $10^{-4}$  g/liter. Electrophysiological analysis showed that the peptides decreased the rate of slow diastolic depolarization, leading to a reduced heart rate. Atrial and ventricular repolarization was accelerated and the action potential plateau disappeared. These observations were consonant with a direct cardiotropic effect of intestinal and brain peptides derived from hibernating susliks. Similar activity was lacking in wakeful susliks. In addition, the brain and intestinal peptides were equipotent. It remains to be determined whether a single peptide or a complex of peptides are responsible for the cardiotropic effects. Figures 2; references 5: 3 Russian, 2 Western.

UDC612.438+577.15/.17

**Thymic Hormones as Precursors of Novel Psychoneuroregulatory Peptides**

9007C0021H Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I. M. SECHENOV in Russian Vol 75 No 5, May 89 (manuscript received 22 Jul 88) pp 691-696

[Article by V. Ye. Klyusha, R. K. Mutseniyetse, I. R. Liyepa, Sh. V. Svirskis, A. V. Andermanis, N. G. Iyevinya, S. Ya. Alberga and I. R. Rituma, Laboratory of Pharmacology, Institute of Organic Synthesis, Latvian SSR Academy of Sciences, Riga]

[Abstract] Trials were conducted on the pharmacodynamics of T-5, the Arg<sup>32</sup>-Lys-Asp-Val-Tyr<sup>36</sup> pentapeptide of the thymic hormones thypomoietin I and II, the RKD (Arg-Lys-Asp) fragment of T-5 which is also found in the C-terminal fragments of  $\alpha$ -interferon, and the polarin SKD found in many immunoactive peptides. Studies on rats and mice demonstrated that T-5 possesses anxiolytic activity on par with benzodiazepines.

The anxiolytic activity of RKD was weaker, and nonexistent in the case of SKD. Both T-5 and RKD corrected stress-induced changes in brain levels of GABA and plasma concentrations of corticosterone, while SKD had no effect. T-5 did not promote myorelaxation nor prevent picrotoxin-induced convulsions, failed to potentiate the effects of haloperidol, and abbreviated ethanol and hexenal-induced stupor. The polarins RKD and SKD behaved similarly. These findings provide evidence that endogenous mechanisms may exist for the production of fragments of thymic hormones in response to adverse stimuli. Consequently, the thymic hormones may function not only in immunomodulation, but also in maintaining neuroendocrine homeostasis. Figures 3; references 12: 4 Russian, 4 Western.

UDC612.822.1+577.15/.17

### Bombesinergic System

9007C0021G Leningrad FIZIOLOGICHESKIY  
ZHURNAL SSSR IMENI I. M. SECHENOV  
in Russian Vol 75 No 5, May 89 (manuscript received  
19 Aug 88) pp 684-690

[Article by A. T. Maryanovich, Ye. L. Polyakov, I. L. Kuranova and S. I. Churkina, Chair of Normal Physiology, Military Medical Academy imeni S. M. Kirov; Chair of Chemistry of Natural Compounds, Leningrad State University]

[Abstract] Data has accumulated on the presence of endogenous bombesin-like peptides and specific receptors in the mammalian CNS, leading to the hypothesis of a bombesinergic system. A survey of the literature based on studies with various bombesin analogs has shown that a major, if not the primary, function of the bombesinergic system is to mediate physiological responsiveness to heat. In addition to changes in the cardiovascular system that significantly increase body heat loss, gastrointestinal function is also affected, suggesting that activation of bombesin mechanisms may be responsible for the well-documented loss of appetite in hot climates. Activation of this system has also been shown to have analgesic sequelae which may involve interaction with endogenous opioid peptides. It also appears that bombesin-like gastrointestinal peptides lack direct CNS effects due to impermeability of the blood-brain barrier. The possibility exists that the central and peripheral receptors for the bombesin family of peptides differ and are susceptible to different antagonists. References 30: 8 Russian, 22 Western.

UDC612.018.2+612.4+612.821.2

### Comparison of TRH and ACTH<sub>4-7</sub> Pro-Gly-Pro Effects on Learning and Spatial Orientation in Rats

9007C0021F Leningrad FIZIOLOGICHESKIY  
ZHURNAL SSSR IMENI I. M. SECHENOV  
in Russian Vol 75 No 5, May 89 (manuscript received  
9 Aug 88) pp 677-683

[Article by N. Ye. Chepurnova, A. A. Guseva, Ye. V. Yefimova, A. A. Martyanov and S. A. Chepurinov, Chair

of Human and Animal Physiology, Biological Faculty, Moscow State University imeni M. V. Lomonosov]

[Abstract] A comparative analysis was conducted on the effects of TRH and ACTH<sub>4-7</sub>Pro-Gly-Pro (ACTH-PGP) on learning and spatial orientation in 250-300 g albino rats to assess the psychotropic effects of TRH vis-a-vis a peptide known to affect memory. The animals were subjected to maze training for 8 days, with the experimental animals receiving intraperitoneal administration of TRH (100 µg/kg/day 30 min before training) or ACTH-PGP (50 µg/kg/day 15 min before training), or both. Both agents were seen to facilitate learning in a T-maze setup and in an open-field experiment with a 12-arm maze. However, a synergistic effect was not obtained when TRH and ACTH-PGP were administered jointly. Studies on spatial memory in a 12-arm maze with food reinforcement again showed beneficial effects of ACTH-PGP (25 µg/kg) administration. These findings provided confirmation of the effects of TRH on learning and spatial orientation, and the lack of interference or synergism between TRH and ACTH-PGP. The target sites responsible for these effects remain to be defined. Figures 3; references 19: 12 Russian, 9 Western.

UDC612.821:612.822.1+577.15/.17

### Regulatory Effects of VIP on Exploratory Behavior of Rats and Brain Neurotransmitter Levels Before and After Frontal Lobectomy

9007C0021E Leningrad FIZIOLOGICHESKIY  
ZHURNAL SSSR IMENI I. M. SECHENOV  
in Russian Vol 75 No 5, May 89 (manuscript received  
13 Jul 88) pp 670-676

[Article by G. A. Romanova and M. Yu. Karganov, Laboratories of Pathophysiology of Neurohumoral Regulation and of General Pathology of the Nervous System, Scientific Research Institute of General Pathology and Pathologic Physiology, USSR Academy of Medical Sciences, Moscow]

[Abstract] Male Wistar rats (180-200 g) were used to assess the effects of VIP (vasoactive intestinal peptide) and anti-VIP serum on exploratory behavior and levels of serotonin, dopamine, and norepinephrine in subcortical formations. The experimental approach relied on a comparison of the effects seen in control animals and rats subjected to a 50% frontal lobectomy. Open-field trials demonstrated that lobectomy led to partial inhibition of conditioned food behavior and a marked increase in locomotor activity over a 9-day period of observation. Intraventricular administration of VIP (80 pg) for 9 days led to recovery of baseline activity and behavior patterns in the lobectomized animals. Intraventricular administration of anti-VIP serum (2 µl) for a similar length of time to the lobectomized rats likewise resulted in normalization of behavior patterns. Analysis of neurotransmitter levels in sham-operated and lobectomized animals demonstrated that VIP administration corrected changes in the levels of the transmitters and that the

anti-VIP serum was even more efficacious. The latter was attributed to the fact that a strictly dose-effect relationship does not always prevail and that similar pharmacodynamics may apply to large and small doses. Evidently, the anti-VIP serum served to reduce the level of endogenous VIP to lower and actually more active concentrations. The results also demonstrated that VIP affects neurotransmitter balance in subcortical brain formations and that neuropeptides may have therapeutic utility in CNS pathology. Figures 4; references 15: 6 Russian, 9 Western.

UDC612.0+577.15/17

### System of Natural Physiologically Active Peptides

9007C0021D Leningrad FIZIOLOGICHESKIY  
ZHURNAL SSSR IMENI I. M. SECHENOV  
in Russian Vol 75 No 5, May 89 (manuscript received  
7 Jul 88) pp 646-655

[Article by A. A. Zamyatnin, Department of Functional Neurochemistry and Biotechnology, Institute of Normal Physiology imeni P. K. Anokhin, USSR Academy of Medical Sciences, Moscow]

[Abstract] Publications dealing with various physiologically active peptides have been increasing exponentially over the last decade, currently exceeding 300 publications per month. Such developments have led to the development of a database to correlate the various structure-activity parameters and create a systematic approach to peptide design. To date, the database covers some 389 peptides, beginning with the structures of oxytocin and vasopressin published in 1953. The spectrum of information presently available is sufficient to plan the design of peptides with desired activities with considerable confidence. Since the data bank is continually updated with new information, this approach to drug design will gain in acceptability and importance. Figures 5; references 27: 17 Russian, 10 Western.

UDC612.822+577.15/17

### Structural Features of Interferon Molecules as Precursors of Immuno- and Neuroactive Oligopeptides

9007C0021C Leningrad FIZIOLOGICHESKIY  
ZHURNAL SSSR IMENI I. M. SECHENOV  
in Russian Vol 75 No 5, May 89 (manuscript received  
22 Jul 88) pp 638-645

[Article by G. I. Chipens, V. Ye. Klusha, N. G. Iyevinya, E. E. Tsilinskis and S. N. Sklyarova, Department of Peptide-Protein Bioregulators, Institute of Organic Synthesis, Latvian SSR Academy of Sciences, Riga]

[Abstract] Interferons have been shown to exert a variety of pharmacodynamic effects, in addition to their well-appreciated antiviral functions. A hypothesis is advanced that the multiple effects of interferons are in fact due to their additional functions as prohormones,

since their limited proteolysis appears to lead to the formation of bioactive peptides. Accordingly, the interferons are classed in a tetin (Tete-a-tete) system of regulatory peptides that are formed in the immediate proximity of target cells and act only at short distances (i.e., the dimensions of a cell). The peptides formed from the various interferons may be polar (polarins), amphiphilic, or peptides with mixed disposition of polar and hydrophobic amino acids. Perhaps the best-studied and best-documented have been the various polarins derived from the C-termini of interferon molecules that function as information transmitters between the immune and the central nervous system. Figures 4; references 20: 10 Russian, 10 Western.

UDC 612.833

### Effects of Thymosin on Electrical Activity of Ventromedial Hypothalamic Neurons

907C0022C Moscow DOKLADY AKADEMII NAUK  
SSSR in Russian Vol 307 No 2, Jul 89 (manuscript  
received 27 Sep 88) pp 500-503

[Article by I. Yu. Orbachevskaya, V. A. Fedan, V. P. Dobrynin, O. G. Sakandelidze, A. M. Boldyrev and S. A. Chepurnov, Scientific Research Laboratory of Biologically Active Substance of Hydrobionts, Moscow; Moscow State University imeni M. V. Lomonosov; Scientific Research Institute of General Pathology and Pathologic Physiology, USSR Academy of Medical Sciences, Moscow]

[Abstract] Central effects of thymosin were studied in rabbits by analysis of its effects on the electrical activity of ventromedial hypothalamic neurons. Electrical stimulation of a posterior extremity in 3-3.5 kg male rabbits elicited avoidance behavior with a latent period of 5-10 sec, with a threshold 10 mA right-angle current. Concomitantly, the ventromedial neurons responded with relatively irregular activity of 1-10, 40-50, and 100-200 msec intervals between spikes (20 of 22 neurons). Administration of 100 ng thymosin into a lateral ventricle enhanced the avoidance reactions, decreased the latent period to 1-2 sec, and diminished the pain threshold to 2-3 mA. Neuronal dischargers became highly irregular with an increase in the number of 1-10 and 40-50 msec intervals between spikes. A 1 µg dose of thymosin inhibited avoidance behavior, increased the latent period to 20-30 sec and the pain threshold to 15-20 mA. Ventromedial monitoring showed inhibition of electrical activity with predominance of 1000 msec intervals. Naloxone in doses of 10 ng, 1 µg, or 10 µg did not affect the responses obtained with the administration of thymosin. In the final analysis, these observations demonstrated a dose-dependent hyperalgesic effect of thymosin at low doses, correlated with discharge patterns in the ventromedial hypothalamus. Figures 4; references 12: 10 Russian, 2 Western.

UDC612.822+577.15/.17

**Involvement of Brain Monoaminergic Systems in Antialcoholic Action of Dermorphin and Delta Sleep-Inducing Peptide (DSIP)**

9007C0021B Leningrad FIZIOLOGICHESKIY  
ZHURNAL SSSR IMENI I. M. SECHENOV  
in Russian Vol 75 No 5, May 89 (manuscript received  
10 Aug 88) pp 633-637

[Article by Ye. A. Gromova, N. V. Bobkova, L. A. Plakkhinas, V. I. Deygin, Ye. P. Yarova and I. I. Mikhalova, Laboratory of Neurotransmitter Systems, Institute of Biological Physics, USSR Academy of Sciences; Laboratory of Peptides Synthesis, Scientific Research Institute of Experimental Cardiology, USSR Academy of Medical Sciences; Laboratory of Peptide Chemistry, Institute of Bioorganic Chemistry, USSR Academy of Sciences, Moscow]

[Abstract] Wistar rats with a starting weight of 180-220 g were employed in experiments designed to test the effects of dermorphin and DSIP on alcohol intake. In the initial stages the animals had been deprived of water for 6-8 months and supplied only with a 20% alcohol solution. After that period, they were given a choice of water or 15% alcohol solution. Animals with an intake of 20 ml/kg/day of alcohol were treated intraperitoneally with 150-200 µg/kg of dermorphin or DSIP for ten days and monitored for the effects on alcohol intake. Both peptides depressed alcohol intake, which in the case of dermorphin represented a 73% reduction. In the majority of cases, diminished alcohol intake was evident after the administration of the peptides and persisted for a month. Analysis of the effects of dermorphin and DSIP on brain neurotransmitters revealed that both peptides depressed hypothalamic levels of serotonin and 5-hydroxyindoleacetic acid, and led to elevation of norepinephrine in the neocortex. In addition, DSIP induced elevation of 5-hydroxyindoleacetic acid in the neocortex without affecting the level of serotonin. These observations point to serotonergic mechanisms of action of dermorphin and DSIP in limiting preference for alcohol in Wistar rats. Figures 2; references 20: 13 Russian, 7 Western.

UDC 612.018+612.4+577.112

**Unidirectional Regulatory Cascades Initiated by Short-Lived Peptides (TRH)**

9007C0021A Leningrad FIZIOLOGICHESKIY  
ZHURNAL SSSR IMENI I. M. SECHENOV  
in Russian Vol 75 No 5, May 89 (manuscript received  
10 Aug 88) pp 627-632

[Article by I. P. Ashmarin, A. P. Kulashev and S. A. Chepurinov, Chair of Human and Animal Physiology, Moscow State University imeni M. V. Lomonosov]

[Abstract] A "regulatory cascade" is proposed for the multiple functions exhibited by numerous peptides with

short half-lives, using the TRH peptide as an example. The hypothesis is based on a cascade of reactions leading to the release of a number of other peptides in a definite sequence, each of which in turn is responsible for the release of still other peptides. Computer-based analysis has provided confirmation of a chain reaction of this type in the case of exogenous TRH as the cascade-initiating peptide. Thus, the effects of TRH are complemented by the effects of ACTH, vasopressin, oxytocin, and TSH in a first-tier cascade, and by VIP as well as ACTH in a second-tier cascade. As a result, the action of TRH is either amplified, maintained, or attenuated by the first- and second-tier cascades, with the induction of other secondary peptides responsible for the prolonged effects of the primary peptide. The system has been successfully simulated using dBASE II. Figures 1; references 18: 11 Russian, 7 Western.

UDC 616.1+616.001

**Disturbances of Cardio- and Hemodynamics in Endotoxic Shock**

18400615A Kiev FIZIOLOGICHESKIY ZHURNAL  
in Russian Vol 35 No 3, May-Jun 89 (Manuscript  
received 5 May 88) pp 43-49

[Article by L. I. Kvachina, V. N. Kotsyuruba, A. A. Moybenko, L. A. Grabovskiy, Institute of Physiology imeni A. A. Bogomolets, UkSSR Academy of Sciences, Kiev]

[Abstract] The mortality rate due to septic shock, a complication of infectious disease and surgical intervention, may be as great as 50%. A key role in the development of the clinical picture of septic shock is played by deep and frequently irreversible hemodynamic disorders—reduced blood pressure and cardiac output. Prompted by the fact that the mechanism of the disturbances of circulation and cardiac action in septic shock has been the focus of few studies, the researchers here studied the hemodynamic characteristics of endotoxic shock to determine the relative role of the cardiac and vascular components in its development and to determine the significance of prostanoids in hemodynamic disturbances. Experiments were performed on 16 mongrel dogs in whom endotoxic shock was reproduced by the introduction of *E. coli* bacterial endotoxin into the blood. The researchers found that the endotoxin had no negative inotropic effect on the myocardium, at least not in the first 1.5-2 hours. They also found that the lower indices of contractive activity that they observed were secondary and could have been due either to reduced coronary blood flow—and, consequently, to disruption of the blood supply to the myocardium—or to the effect produced on the myocardium by products of biologically active substances, particularly prostanoids, that form during the reaction to the endotoxin. The endotoxin initiates vasodilator reactions in the coronary vessels and apparently the large vessels. The expansion of the coronary and large vessels may be due to the predominate formation of prostacyclin, which is a powerful

vasodilator. That hypothesis is supported by the fact that blockage of the biosynthesis of prostanoids reduces considerably the dilatory reactions of the coronary vessels and the initial pooling of blood in the first 30 minutes, in all probability thereby preventing the development of shock. The increased pooling that is observed in the subsequent development of a reaction to the endotoxin and to the accompanying drop in systemic arterial pressure and cardiac output by the second hour points to the existence of other mechanisms of endotoxic hypotension. Figures 4; References 16: 7 Russian, 9 Western.

UDC 612.821.6+577.15/.17+612.434.4

**Influence of Oxytocin and Vasopressin on Individual Behavior and EEG Correlates in 'Open Field' Testing of Narcotically Dependent Rats**

18400641A Leningrad FIZIOLOGICHESKIY  
ZHURNAL SSSR IMENI I. M. SECHENOVA  
in Russian Vol 75 No 4, Apr 89 (Manuscript received  
26 Nov 88) pp 441-446

[Article by R. Sh. Ibragimov, F. M. Bayramova, F. G. Dadashev, Laboratory of Adaptive Functions of the Brain, Institute of Physiology imeni A. I. Karayev, AzSSR Academy of Sciences, Baku]

[Abstract] A study is made of the effect of intracerebroventricular administration of neurohypophysis peptides oxytocin and vasopressin on individual behavior of narcotically dependent rats in an open field test and on the neurodynamic processes of brain limbic structures characterized from spectral-correlation EEG parameters and segmented with etiologic criteria. The experiments were performed on Wistar rats that had developed a tolerance for twice-a-day injections of heroin. The researchers hypothesize that the administration of oxytocin, which participates in the mechanisms of "acceptor action," leads to a conflict situation between a state of reduced satisfaction and a state stimulating the animal to investigate the environment in the "open field." Oxytocin restores to some extent the behavior characteristic for the natural orientation reaction. Vasopressin, which participates in afferent synthesis mechanisms and has a stimulating effect, maximizes the state of euphoria. Figures 3; References 6: 4 Russian, 2 Western.

UDC 616.12-02:613.863]-092:612.  
129:[547.95:547.943].014.49

**Correlation Between Myocardial Stress Damage and Changes in  $\beta$ -Endorphin During Preliminary Adaptation**

907C0167A Moscow BYULLETEN  
EKSPERIMENTALNOY BIOLOGII I MEDITSINY  
in Russian Vol 107 No 6, Jun 89 (manuscript received  
20 Feb 88) pp 662-665

[Article by L. V. Maslova and Yu. B. Lishmanov, Laboratory of Radionuclide Research Methods, Scientific

Research Institute of Cardiology, Tomsk Scientific Center, USSR Academy of Medical Sciences]

[Abstract]  $^{99m}\text{Tc}$ -Pyrophosphate (TcPP) binding to myocardium was used as an indicator of stress-induced myocardial damage in 160-180 g albino male rats to assess the role of stress-adaptation or adaptogen administration vis-a-vis brain and plasma levels of  $\beta$ -endorphin. Adaptation to pain by 5-10 short-term immobilization sessions or administration of Rhodiola rosea extract (1 ml/kg/day; 5-8 days) did not prevent a rise in TcPP binding to the myocardium in response to stress, but reduced the level of binding 2- and 2.5-fold, respectively. Stress alone, although leading to elevation of plasma  $\beta$ -endorphin, resulted in a statistically significant reduction in hypothalamic and midbrain levels of  $\beta$ -endorphin. Both forms of adaptation were shown to lead to a marked increase in the  $\beta$ -endorphin levels in plasma, midbrain, and hypothalamus, and thereby mitigate the effects of stress. These changes in the  $\beta$ -endorphin levels in the adaptive phase were, accordingly, implicated in the protective mechanisms of adaptation. Figures 1; references 11: 7 Russian, 4 Western.

UDC 616-005.1-001.36-085.31:547.95.547.943]-  
036.8-092.9

**Effects of Opiate Agonists on Course of Hemorrhagic Shock in Rats**

907C0167B Moscow BYULLETEN  
EKSPERIMENTALNOY BIOLOGII I MEDITSINY  
in Russian Vol 107 No 6, Jun 89 (manuscript received  
5 Aug 88) pp 667-669

[Article by V. D. Slepishkin, I. Grassler, G. K. Zoloyev and D. V. Scheuch, Laboratory of Pathophysiology, Scientific Research Institute of Cardiology, Tomsk Scientific Center; Institute of Pathologic Biochemistry, Dresden]

[Abstract] Male Wistar rats, 200-250 g, were used to assess hemodynamic effects of opioid agonists in hemorrhagic shock induced by a single bleeding equivalent to 3% of body weight or fractional hemorrhage of 30% of circulating blood volume (CBV) over a 30 min period. The  $\delta$ -agonist (L-tyr-D-ala-gly-L-phe-D-leu) and  $\mu$ -agonist (L-tyrosyl-D-alanylglycyl-N-2-hydroxyethyl-N<sup>o</sup>-methyl-L-phenylalaninamide) were administered intravenously in a dose of 1 mg/kg 10 min after the single bleeding and in the fractional experiment after removal of 7.5% of the CBV. Hemodynamic monitoring demonstrated that administration of the opioid agonists decelerated both the hypotensive changes in response to hemorrhage and the recovery of BP in the immediate post-hemorrhagic phase. In both situations the effects of the agonist acting on the  $\mu$  class of receptors were more pronounced than the effects of the agonist acting on the  $\delta$  class of receptors. While to some extent the effects with the opioid agonists are attributable to direct action on the cardiovascular system, the data also indicate that



enhancement of myocardial tolerance of hypotension-related hypoxia was a factor. Since the  $\mu$  receptors are known to mediate a more pronounced antihypoxic effect than  $\delta$  receptors, the greater efficacy of the  $\mu$  agonist tested here in controlling hypotension becomes understandable. References 12: 10 Russian, 2 Western.

UDC 612.821

### Brain Potentials During Mental Operations of Varying Difficulty

18400637A Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 15 No 3, May-Jun 89 (Manuscript received 5 Jul 88) pp 11-18

[Article by A. M. Ivanitskiy, All-Union Scientific Research Institute of General and Forensic Psychiatry imeni V. P. Serbskiy, Moscow]

[Abstract] Previous studies have demonstrated the significance of coherence of bioelectric activity of various areas of the cortex in the solution of certain kinds of problems. In their work on neurophysiological aspects of mental activity, N. P. Bekhterevaya and her colleagues have derived data on the significance of various subcortical nuclei in thought processes. The search for new methodologic approaches to the study of thinking mechanisms remains important. Considering the effectiveness in psychophysiological research of the method of event-related potentials, identifying the potentials that reflect thought processes would seem quite promising. The authors studied biopotentials of the brain produced by retrograde summation of electrical activity from the moment of a motor response. Retrograde summation was used here to study cerebral processes related with the selection of a reaction from among several alternatives. As a result, a complex of waves was identified that can be associated with the solution related to the response of the subject to stimulus information. This complex has been called the "reaction selection potential," and it is a potential that increases in amplitude and complexity with increasing task difficulty. It reflects general fluctuations in the level of activation of brain structures during the process of and upon completion of decision making. Figures 6; References 8: 6 Russian, 2 Western.

UDC 612.89:577.4+612.273

### Adaptation of Animals to Hypoxic-Hypercapnic Effects in Desympathization

18400641B Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I. M. SECHENOVA in Russian Vol 75 No 4, Apr 89 (Manuscript received 12 Nov 87) pp 562-566

[Article by N. I. Mikhalkina, T. N. Danilevskaya, Laboratory of General Physiology, Laboratory of Biochemistry, Institute of Physiology, Kazakh SSR Academy of Sciences, Alma-Ata]

[Abstract] The concept of mechanisms of development of adaptation to unfavorable external effects, including

hypoxia, suggests that factors of the environment amplify the functions of various organs through the neuroendocrine regulatory apparatus. A study of the intensity of metabolic processes in the myocardium during adaptation to noncontinuous hypoxic-hypercapnic and hypoxic states, as well as studies of myocardial circulation under the same conditions, indicate development of cardiac hyperfunction and hypertrophy. This article reports on a comparative study of the influence of reserpinization of animals on the development of cardiac hypertrophy with repeated short-term hypoxia and combined hypoxia and hypercapnia. Experiments were performed on 105 male white rats that were placed daily in a closed space for an average of 1.5 hours. By the end of the exposure the oxygen content in the nonventilated space was 10.2%, carbon dioxide content 8%. Administration of reserpine after 7 days caused a significant increase in heart mass. A still greater increase was noted after 15 days of hypoxic-hypercapnic effect, whereas after hypoxia alone there was a certain decrease in heart mass in comparison to 7 days of hypoxia. The results indicate a change in the relationship of regulatory sympathetic and parasympathetic influence on adaptive restructuring of the myocardium in reserpinized animals. References 19: 13 Russian, 6 Western.

UDC 617-089.163-07:616:8-003.96-072.7

### Experimental Evaluation of Human Adaptive Reactions in Presurgical Period

18400637B Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 15 No 3, May-Jun 89 (Manuscript received 15 Jan 88) pp 151-157

[Article by Yu. U. Mankov, Central Military Clinical Hospital imeni A. A. Vishnevskiy, Moscow Oblast]

[Abstract] The study of the development of adaptive reactions by patients before surgery is a very important but neglected scientific problem. The researchers here set out to examine the effects of presurgical factors on the functional state of the body and on certain personality traits. The article presents the results of studies performed in search of components that foster an adaptive effect in the presurgical period. Mental characteristics studied included level of alarm, system of relationships, and mental image. The physical status of the patient the day before surgery was also evaluated. Twenty-three males and 28 females 41-70 years of age were studied over a three-day period when the patients knew when surgery would take place. The researchers concluded that indices of reactive and personal alarm before surgery reflect the process of adaptation of patients to new, unusual conditions of living. They help reveal the situational and adaptive aspects of their behavior and point to essential features in the mechanisms of regulation of mental functions. The system of personal relations formed during preparation for surgery represents a reflective and regulating factor that has a considerable

influence on the adequacy of behavioral reactions that have an adaptive effect in the presurgical period. Mental reflection develops against a given background of organization of informational processes in the brain, resulting in the development of a goal pattern, the basic component of which is a "picture of the next day." Stress testing indicates that the physiological components of adaptive reactions prior to surgery involve constriction of the functional range by the appearance of behavioral components preventing adequate reaction to the physical stress. References 16: 15 Russian, 1 Western.

UDC 612.273+612.017.2

### Physical Capacity of Mountain Climbers When Inhaled Air Has Extremely Low $pO_2$

18400615B Kiev *FIZIOLOGICHESKIY ZHURNAL* in Russian Vol 35 No 3, May-Jun 89 (Manuscript received 14 Jun 88) pp 68-74

[Article by A. Z. Kolchinskaya, P. V. Beloshitskiy, V. D. Monogarov, R. V. Pivnutel, P. A. Radziyevskiy, A. N. Krasnyuk, A. A. Ivashkevich, A. N. Borisov, Kiev Institute of Physical Culture, Ukrainian State Committee on Physical Culture and Sports]

[Abstract] A study was made of the relationship between the oxygen conditions of the body associated with extremely low  $p_iO_2$  and physical capacity and maximum oxygen consumption in highly trained mountain climbers. Observations were performed over a two-year period in the Grand Caucasus and the Pamirs and in an altitude chamber at the Elbrus Biomedical Center of the UkSSR Academy of Sciences Institute of Physiology imeni Bogomolets. The studies were performed at altitudes of 2,100, 3,500, 4,200, and 5,120 m above sea level, with  $p_iO_2$  values of 130, 103, 92, and 83 mm Hg (in the Grand Caucasus); at 4,100 and 6,100 m above sea level, with partial oxygen pressures of inhaled air of 90 and 73 mm Hg (in the Pamirs); and at 7,500 m above sea level, 61 mm Hg (in the altitude chamber). Bicycle ergometer studies indicated that working capacity and oxygen consumption at 2,100 m were virtually identical to the values recorded among athletes at sea level. At  $p_iO_2 = 61$  mm Hg, well-trained mountaineers were capable of exertions considered moderate at sea level. Maximum oxygen consumption decreased less than did

working capacity (17% versus 30%). Working capacity was basically limited by the reduced capability for oxygen utilization by the muscle tissue as the oxygen tension in the arteries and veins dropped below critical levels. The change in working capacity varied with the individual body and with amount of experience, which enabled a respiratory response to the lower  $p_iO_2$ , economized breathing, and development of adaptation mechanisms in the brain tissue, skeletal muscles and heart. References 25: 18 Russian, 7 Western.

UDC 616.74:014.49

### Effects of Cold Conditioning of Rats in Ice Baths on Radiosensitivity

907C0024C Moscow *DOKLADY AKADEMII NAUK SSSR in Russian* Vol 307 No 4, Aug 89 (manuscript received 23 Dec 88) pp 1010-1012

[Article by M. F. Popov, V. A. Krylov and I. V. Semenova, Institute of Evolutionary Animal Morphology and Ecology imeni A. N. Severtsov, USSR Academy of Sciences, Moscow]

[Abstract] To date, no studies have reported on the effects of cold conditioning on radiosensitivity, although the beneficial effects on other physiological parameters have been well documented. Accordingly, a study was undertaken to determine the effects of such procedures on radioresistance of outbred rats to chromosomal damage in epithelial cells of the small intestine. For the conditioning, male rats (170-180 g) were bathed in 0-3°C water for 30 sec three times per week for five weeks. Three days after the course of conditioning they were challenged with a whole-body x-ray dose of 3.5 Gy. Analysis of the data for the various experimental and control groups demonstrated that cold conditioning increased the number of cells without chromosomal aberrations to 37.88% from 14.2% in unconditioned control rats ( $P < 0.01$ ). Animals that had been transferred to water at 33°C for 30 sec immediately after cold-treatment showed a reduction in the number of intestinal cells without chromosomal damage to 19.25%. These findings demonstrated that cold conditioning for 5 weeks had a telling effect on enhancing radioresistance of the experimental animals, a fact attributed to nonspecific reinforcement of resistance mechanisms. References 15: 11 Russian, 4 Western.

614.2:008(47+57)

**Tasks of the Health Care Agencies and Institutions in Terms of Carrying out the 'Basic Guidelines for the Development of Public Health Protection and the Restructuring of Health Care in the 12th Five-Year Plan and in the Period up to the Year 2000'**

18402018b Moscow SOVETSKOYE  
ZDRAVOOKHRANENIYE in Russian No 2, 89 pp 3-22

[Article by Ye. I. Chazov, USSR minister of health, is a paper read at the All-Union Congress of Physicians]

[Text] But at the same time, we must also think some about protecting the physician, his honor, and his dignity. Objectiveness—that's the criterion of the relationship of society to the physician and the moral stance of every citizen toward medicine. The overwhelming majority of physicians are honest, selfless working people who deserve the gratitude of our public. We must also do some thinking about society's protection of the physician. After all, most of them are women and mothers. Today, more than 350,000 medical workers do not have their own housing. The decree of the CPSS Central Committee and the USSR Council of Ministers "On Measures for Further Improvement of Health Protection and for Strengthening of the Material-Technical Base of Health Care"—which calls for including housing for no less than 25% of the workers in the plans for health-care facilities—had scarcely come out when the Gosplans of a number of republics refused to allocate funds for that purpose. The morbidity and mortality rates among health-care workers are among the highest in the country, but we have almost no sanatoria/preventive clinics for ourselves and no health-improving centers, not to mention that working conditions in most of the medical institutions are bad.

The charity and selflessness of the unnoticed, yet heroic daily actions of medical people have inspired many writers and artistic figures to create remarkable works that have been recognized by the public. We long remember the images of physicians and medical scientists in the works of A. Korneychuk, V. Kaverin, V. Panova, Yu. German, A. Sofronov, and Yu. Krelin and in the films of S. Gerasimov, I. Kheifets, and D. Khrabrovitskiy. We remember the images created by such actors as A. Batalov, T. Makarova, E. Bystritskaya, A. Popov, I. Savvina, and O. Yefremov. I would like to believe that with the widespread criticism of health care, our writers and theater and movie figures of today would also continue that tradition. Medical people who conscientiously perform their duties need more than just a good word—although it, of course, wouldn't be superfluous in the restructuring and restoration of the trust between society and medicine. What's also needed today are profound artistic works devoted to the moral problems of medicine and to the uncompromising battle that is being waged right now for the preservation and augmentation of the humanistic traditions of our medicine.

Respected comrades! During these days at the congress, we must critically and, at the same time, constructively review the most effective means and methods of restructuring and improving the health protection of the Soviet people. Today, the foundation is being laid for the Soviet medicine of the future. We all recognize splendidly the value of the decisions that will be made in this period that represents a turning point for the fortunes of health care. Neither we nor society can tolerate the present situation any longer.

The party and the state have outlined a strategy for the restructuring and improvement of health care and have allocated funds for strengthening its material-technical base. Now it's in our hands and in the hands of the local party committees and organs of Soviet power.

Allow me on your behalf to assure the party and our society that we will devote all our energies and knowledge to the business of restructuring and preserving the most precious wealth of our Homeland—the health and life of the Soviet people!

#### New Books

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Gribanov E. D. "Meditsina v neobychnom" [Medicine in Unusual Circumstances]. Moscow: Sov. Rossiya, 1988, 174 pages.

Yekaterinoslavskiy Yu. Yu. "Upravlencheskiye situatsii: analiz i resheniya" [Management Situations: Analysis and Solutions]. Moscow: Ekonomika, 1988, 191 pages.

### Problems in Supplying Medical Instruments

907C0113B Moscow *PRAVDA* in Russian 18 Oct 89  
Second Edition p 3

[Article by V. Matukhnov, deputy general director of Medinstrument Scientific Industrial Association, and Ye. Zelenov, head of Scientific Research Department of Prospective Medical Developments: "With a Rusty Scalpel"]

[Abstract] The Soviet Union has only about a quarter of the medical instruments it requires, and the situation is not much better when it comes to the variety of instruments that are available. All the efforts to date to rectify this situation have fallen short because of bureaucracy. In 1987, the Ministry of Medical and Microbiological Industry was reorganized, and the production of equipment for health care was transferred to the USSR Ministry of Instrument Making, Automation Equipment and Control Systems. At the present time some progress has been made in modernizing plants producing medical instruments and apparatus and in expanding product variety. However, the industry does not have the productive capacity to fill demand, and capital construction plans announced by the Ministry of Construction in the Southern Regions of the USSR for 1989-1990 did not include any primary medical-instrument plants. There is a shortage of microsurgical instruments, as well as corrosion-resistant materials for all types of medical instruments. Use of a novel method developed at the Medinstrument association to strengthen instruments would extend the life of the instruments by a factor of 3-8. To date, however, efforts to convince the ministries of electronics industry and electrical equipment industry to use the method have failed. It does not appear that the problem of supply of medical instruments will be resolved in the coming five-year plan. The only solution appears to be to establish a system of centralized state financing and government coordination and monitoring of supply and demand factors.

UDC 61+57]:001.8:002.6

### Logic-Semantic Modeling of Hardware and Software Configurations for Biomedical Measurements

18402117 Moscow *VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR* in Russian No 4, 89  
(manuscript received 16 Nov 88) pp 77-83

[Article by S. F. Ostapyuk, Yu. V. Grum-Grzhimaylo and B. V. Ionov, Central Order of Lenin Institute of Postgraduate Medicine, USSR Ministry of Health, Moscow]

[Abstract] The creation of automatic biomedical measurement systems requires logic-semantic modeling of hardware and software configurations suitable for clinical and research applications. The development of such modeling systems has become one of the most important

research areas of medical informatics. The logic-semantic approach was designed to allow maximum selectivity of sensors to permit a wide variety of diagnostic applications through the formulation of a semantic network reflecting the various technical components. Automation is attainable in two stages. In the first stage individual procedures used for the extraction and collation of information are automated through reliance on standard packets of application programs. The second stage of automation involves development of special expert systems. References 6 (Russian).

### State-Cooperative Organization Described

907C0147B Moscow *MEDITSINSKAYA GAZETA*  
in Russian 5 Jul 89 p 1

[Article by V. Natalich, chairman of the Eskulap Cooperative and physician-administrator of Higher Category Health Care, Kiev: "'Thank You, Cooperative Operators!'" Say 'Eskulapa' Patients"]

[Abstract] The Eskulap [Aesculapius] cooperative of physicians in Kiev has reached an agreement with the local polyclinic in one of the new residential developments that is mutually beneficial to both entities and ensures high quality medical care. Instead of simply paying rent for the use of the polyclinic facilities, the cooperative shares its income with the polyclinic and provides the clinic with the services of medical specialists. In addition, the cooperative has arranged health education courses for the public and provides free medical care and consultation for WWII veterans. The cooperative also holds health seminars at schools, and plans are currently being formulated to provide health care at a local recreation area in the future.

UDC 615.12(476)

### Tasks of the Belorussian Pharmacy Services in the Reorganization of Medicinal Supplies for the Public

907C0538A Moscow *FARMATSIYA* in Russian Vol 38  
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[Article by V. I. Pokrovskiy, Belorussian Republic Industrial Association 'Farmatsiya': "Tasks of Belorussian Pharmacy Services in the Reorganization of Medicinal Supplies for the Public"]

[Text] The Fifth Congress of Belorussian Pharmacists, Pharmacologists and Toxicologists was held in Minsk June 1 - 2, 1989 at which the present and future status of medicinal supplies for the republic's population was broadly and thoroughly discussed.

In the period since the Fourth Republic Congress which took place in December, 1983, the republic's pharmacy network increased to 91 pharmacies and 131 facilities were built for new pharmacies and for the improvement of working conditions at operating pharmacies. Capital

repairs and reconstruction were undertaken at 80 pharmacies. The republic has 1,211 functioning pharmacies, including 613 in the rural areas.

The average number of inhabitants per pharmacy is 8,420. This includes 11,290 in the cities and 5,610 in the rural areas (the norm for the BSSR is 13,000 persons per urban pharmacy and 6,000 persons per rural pharmacy).

However, if one brings the network of pharmacies as a whole up to the standard requirements, the number of pharmacies is below the norm requirements in a number of cities of the republic (Borisov, Baranovich, Pinsk, Vitebsk, Novopolotsk, Soligorsk, Bobruyk, and Molo-dechno). Thirty-three pharmacies have an insufficient material base. The republic does not have any pharmaceutical plants for the centralized manufacture of primarily injectable solutions. Injectable solutions are prepared largely manually at the base of general pharmacies. The cost for such purposes in the republic comes to 6.5 million rubles annually.

The development of pharmaceutical plants is being held up by the lack of domestically manufactured technological equipment. Favorable conditions for resolving this problem are being made as a result of transferring a number of military enterprises to the production of civilian items. The significance of pharmaceutical plants for the manufacture of injectable solutions and a number of other drug forms exceptionally high under normal conditions and particularly so in the event of any catastrophes. Such plants have been built in the GDR in combination with major therapeutic institutions. We believe that the Soyuzfarmatsiya association and its component the All-Union Scientific-Research Pharmacy Institute will be able to accord substantial assistance to the republics in this matter.

Problems concerned with shortcomings in the supply of drugs were topics of particularly sharp discussion at the Congress. On the average, the supply of medicinals in the republic meets only 75 - 80% of the required needs. Requisitions for drugs in 1989 were only 72% filled. Insufficient funds were allotted for 400 medical items, including 150 items that were 50% below the required needs. No funds at all were allotted for 166 drug items. Beginning in 1989 drug deliveries for 74 items were to be organized on the basis of direct ties between the Farmatsiya associations and the plant suppliers. As of the present time contracts have not yet been negotiated with the plant suppliers for 17 of the 74 indicated drug items. The reason for this is the unwillingness of the plants to switch over to progressive direct ties with purchasers of their products. The plants that manufacture and supply the pharmacy network with drugs and other medical items are not interested in the consumer, but on the contrary, are trying to avoid the delivery of their manufactured goods and in fact are attempting to reduce the output volume. Under such circumstances the transition to direct ties between the Farmatsiya associations and the plant suppliers cannot lead to an improvement in the availability of medicinals for the public.

A number of organizational problems become evident in connection with the considerable difficulties encountered in the supply of medicinals to the public and public health institutions. First of all there this concerns the use of hard currency funds by plants and enterprises who sell their products abroad and receive part of the currency for their own use.

Some enterprises have asked us to help them purchase imported drugs with their hard currency, but only to provide personnel working at their own enterprise. In our opinion this arrangement is devoid of social justice principles. Surely, some one is providing food products, clothing, footwear, housing, etc., to the workers at enterprises who are receiving hard currency for the sale of their products to other countries. Is it fair that this "some one" should be deprived of the right to acquire drugs purchased with the hard currency of the enterprises they service? On the other hand, there are the purely practical difficulties in the use of hard currency funds of enterprises to acquire drugs for their own employees only. Usually, the enterprises allot small amounts of hard currency for these purposes and wish to acquire a greater variety of imported drugs in small quantities. Such purchases are frequently practically impossible to conclude.

In light of what has been said we believe it would advisable to request that the government of the USSR obligate all enterprises that have their own hard currency to transfer part of it to the public health authorities for the centralized acquisition of drugs abroad that are in short supply in our country.

There is also a need to change the manner in which drugs are supplied to the public. In accordance with an order of the USSR Ministry of Health, persons who present prescriptions at pharmacies for drugs that are temporarily out of stock are registered on a waiting list, and holders of such prescriptions receive those drugs in the order of their registration as the drugs become available at the pharmacies. An analysis of such prescriptions in Minsk showed that in 1989 in order to supply the waiting list alone formed in 1988 we would need about 50% of the annual amount of ATP, more than 80% of the annual amount of Borzhom mineral water, more than 25% of hyaluronidase, 30% of nitroglycerin, etc.

All of the pharmacy network's resources for borzhom mineral water are used only for Fatherland War disabled veterans (FWV). The rest of the republic's residents, including children, have practically no chance of buying even a single bottle of this water at the pharmacies. This is explained by the fact that Borzhom water is issued to FWV free of charge.

We analyzed the dispensation of drugs at pharmacies on the basis of no-cost prescriptions to FWV and found that some veterans were annually receiving up to 1,000 packages of 60 to 80 different drug items at a total cost of more than 1,000 rubles. Moreover, the number of dispensed tablets alone was up to 16,000 per year.

During house visits to citizens receiving medicines at pharmacies free of charge we found that these household drug stores had from 60 to 196 unopened packages of costly medicines that were in short supply. One would have to conclude that the gratuitous dispensation of drugs at pharmacies for ambulatory patients is economically irrational, causes moral and material losses to the state, creates considerable difficulties for supplying these drugs to other patients, and entails other negative consequences.

It would seem advisable to us to establish supplemental payments to pensions for the acquisition of drugs by persons who enjoy the right of acquiring medicinals free of charge and on a privileged basis.

The drug plant resources constitute a definite potential for improving the supply of medicinals to patients. In the best harvest years the republic's pharmaceutical institutions procure up to 190 tons of dried medicinal plants. In connection with the Chernobyl nuclear plant accident, the possibilities for procuring medicinal raw plants was significantly narrowed, and as early as 1988 the republic could only procure 121 tons. This exacerbated the drug supply problem. The current situation in the country with respect to purchasing and sale prices for medicinal raw plants constitutes an obstacle to the further cultivation of medicinal plants. The purchase prices are lower than the market prices, and the sale prices are lower than the purchase prices. Consequently, the public has no interest in turning over medicinal raw plants to the pharmacies and the pharmacies are incurring losses from the sale of procured medicinal raw materials. In 1988 such losses in the republic came to about 300,000 rubles. The possible use of cooperatives for the procurement of medicinal raw materials is totally excluded. The explanation obtained from the Soyuzfarmatsiya gives it the right to receive medicinal raw materials from the cooperatives at contractual prices, but to sell those materials at current retail prices creates restrictions and difficulties in this matter.

It would seem advisable to us to recruit the cooperatives for the procurement of medicinal plant materials with the right to process the crude material into medicinal bales, and subsequently into soluble medicinal infusions with the proviso that quality control would be maintained by Farmatsiya association service units and that the soluble infusions would be sold through the pharmacy network at negotiated prices. By maintaining the present prices for crude medicinal plants and the interrelation conditions with the cooperatives the procurement of crude medicinal plants will be reduced. This will in no way satisfy the interests of patients.

An administrative restructuring of the country's pharmacy services is now in progress. Its first stage in the republic is concerned with the reorganization of the pharmacy administrations in the Farmatsiya association. The next stage involves the transition of the pharmacy service to a self-financing basis. This will activate the economic levers of pharmacy service management.

This will be possible only if prices for drugs and crude medicinal plants are rectified and charges are introduced for manufacturing drugs at pharmacies.

The Belorussian pharmacy network has been incurring losses of more than 10 million rubles annually through the sales of drugs alone whose retail prices are lower than the wholesale prices as well as through the sale of crude medicinal plants at retail prices that are lower than the purchase prices, and as a result of the gratuitous preparation of injectable solutions.

In addition, pharmacies must package drugs, bandages, and other aids that are received from industry in an unpackaged form, and this constitutes unproductive manual labor.

More than 1.5 thousand tons of cotton are packaged daily since cotton is supplied to the pharmacies in 50 kg bales. There is a considerable list of drugs (more than 500 items) whose retail prices are the same as the wholesale prices. In working with these drugs, the pharmacy network receives no compensation whatever for the expenditures incurred in handling these drugs.

Consequently, the republic's pharmacy network today is on the brink of unprofitability. This is a primary obstacle to the network's transition to full cost-accounting and self-financing. Given the current pricing policy for drugs and other medical items, the activation of economic management levers in the pharmacy network is becoming difficult to implement.

In this connection, the Congress has supported and accepted the justification for a proposal introduced previously by the Belorussian Republic Production Association Farmatsiya to establish single-unit 39% discounts off trade prices for drugs sold at pharmacies as well as the proposal to institute charges for preparing medicinals at pharmacies in accordance with expenditures.

The pharmacy warehouses occupy a special place in the organization of drug supply. An evaluation of pharmaceutical institutional operations indicates that up to the present time warehouses are to a certain degree equated with pharmacies. This does not reflect the nature of their nature and importance in the organization of drug supply. There will probably be a future need to organize a warehouse association in the republic that would include all of the republic's warehouses. If warehouses were properly equipped with computer technology and there were to have greater responsibility for the status of drug supplies, this kind of solution might be fully acceptable and realistic. This requires thorough investigation.

The restructuring now in progress also requires the active efforts of scientific institutions to develop recommendations for more economically substantiated measures in the implementation of team methods as applied to labor organization and wages as well as leasing methods for pharmacy operations.

More than 50 institutions in the republic have introduced the team method of labor organization and wage payments. However, much is being done by the initiative method without proper economic substantiation. Leasing conditions at the republic's pharmacy institutions have not yet been applied in a concrete manner.

Computerization of pharmaceutical institutions is the demand of the times. It is only at its initial stage in the republic. This requires the training of personnel both at the institutes and in advanced training courses, and the organization of an appropriate base at the institutes.

Pharmacist personnel also need to be retrained with respect to economic problems. Two cycles of such training have already been carried out in Minsk at the Institute for the National Economy.

In accordance with the regulations of the Farmatsiya associations, supervisory personnel at pharmacy institutions are appointed by election. The assignment of association supervisors in the course of their organization does not deprive the association and institution staffs of their right to reelect the latter if such necessity arises.

More favorable conditions for an increase in the number of young specialists must also be created on the basis of democracy and openness. We believe it would be advisable to introduce the practice of accepting applications for supervisory positions at pharmacies from young specialists. Following an appropriate examination of these specialists' potential and a training period, they should be proposed for election by the staffs to supervisory positions on the basis of competitive selection. This kind of approach should heighten the vocational and public activity of young specialists and would have favorable effects on the organization of pharmacy operations.

The labor collectives must participate in the nomination of specialists and the preparation of references for their certification. They must also introduce proposals to deny a skilled category qualification to any specialist who has committed errors or violations in his work.

The resolution of the indicated organizational problems and the installation of the required technology at pharmacy institutions will make it possible to raise the level of providing medicinals to the public.

The Congress summarized the results of the Society's scientific activity and outlined ways for the future development of pharmaceutical science in the republic.

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### **Problems in Applying Self-Financing to Medicine**

907C0113A Moscow SOVETSKAYA ROSSIYA  
in Russian 27 Oct 89 Second Edition p 4

[Interview with Professor Rufina Aleksandrovna Malysheva, director of the Sverdlovsk Scientific Research Institute for the Protection of Mothers and Children, under the rubric "Medicine for Everyone": "The Apparition of Ready Cash: A Medical Scientist Discusses the Losses in Cost-Accounting"]

[Abstract] Implementation of self-financing in Soviet medical care is seriously complicated by administrative inexperience and the existing economic system. Such are the views of Professor R. Malysheva of the Sverdlovsk Scientific Research Institute of the Protection of Mothers and Children. The one success story in medical self-financing that is often quoted, that of the "Mikrokhirurgiya Glaza" [Eye Microsurgery] firm founded by S. Fedorov, is entirely too atypical to serve as a model for anything more than a narrow medical specialty or procedure, such as an abortion service. In addition, Fedorov's firm owes its very existence to his strong personality and marketing and managerial skills, and the fact that, according to Malysheva, he "has an answer for everything." A group of physicians specializing in a narrow spectrum of medicine, such as eye microsurgery, is faced with much simpler planning requirements and cost accounting than a research institution or a general hospital. For one thing, research cannot be run on the basis of an immediate financial gain. Furthermore, research institutes and general health facilities, in accordance with existing practices and contractual agreements, are faced with providing medical care regardless of profit. Finally, according to Malysheva, there are ethical constraints that should preclude medical practice from being transformed into a simple business proposition.

UDC 577.175.5:612.82:577.346

**Rat Brain Catecholamines in Initial Period of Acute Radiation Exposure**

18400642A Kiev UKRAINSKIY BIOKHIMICHESKIY  
ZHURNAL in Russian Vol 61 No 3, May-Jun 89  
(Manuscript received 20 Sep 88) pp 90-96

[Article by Ye. V. Skopenko, G. I. Parkhomets, A. N. Vasilyev, N. Ye. Kucherenko, Kiev University imeni T. G. Shevchenko]

[Abstract] Biogenic amines have antiradiation effects and are capable of forming an endogenous background of radioresistance. This article studies the content of dopamine and noradrenaline in the rat brain, as well as active uptake and release of neurotransmitters in the

early period following acute whole-body irradiation at 0.21 C/kg. The animals were sacrificed one hour after irradiation, and studies were performed on the gray matter of the brain. Dopamine and noradrenaline increased in the gray matter by 11 and 60%. Apparently, identical mechanisms are responsible for both increases. The researchers conclude that the process of dopamine release is depressed, and the process of its re-uptake is activated, which, they hypothesize, decreases the probability of catabolism of the transmitter in the extracellular medium, which may result in an increase in the content of dopamine in the brain tissue. Whole-body irradiation has a less pronounced effect on the release of noradrenaline from synaptosomes; the highly affine uptake of noradrenaline is reduced. Figures 2; References 25: 14 Russian, 11 Western.



UDC 547.963..3:576.858.43

**Primary Structure of RNA Polymerase Gene of  
Foot-and-Mouth Disease Virus (FMDV) A<sub>22</sub>**

18400538F Moscow BIOORGANICHESKAYA

*KHIMIYA in Russian Vol 15 No 3, Mar 89 (manuscript  
received 23 Aug 88) pp 419-422*

[Article by I. V. Kuzmin, S. S. Rybakov, V. N. Ivanyushchenkov and A. N. Burdov, All-Union Scientific Research Foot-and-Mouth Diseases Institute. State Agroindustry, Vladimir]

[Abstract] Conventional techniques of genetic engineering were used to obtain cDNA corresponding to the RNA polymerase gene to FMDV A<sub>22</sub>, with a map of the primary nucleotide sequence of the cDNA provided. Analysis of the data on the corresponding amino acid sequence for the enzyme revealed that ca. 4% of the amino acids differed from the sequences obtained for RNA polymerases of other FMDV subtypes. The exchanges occurred mostly the N-terminal end of the molecule. Figures 2; references 8: 3 Russian, 5 Western.

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